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FACTORY

APRIL 1953

MANAGEMENT AND MAINTENANCE

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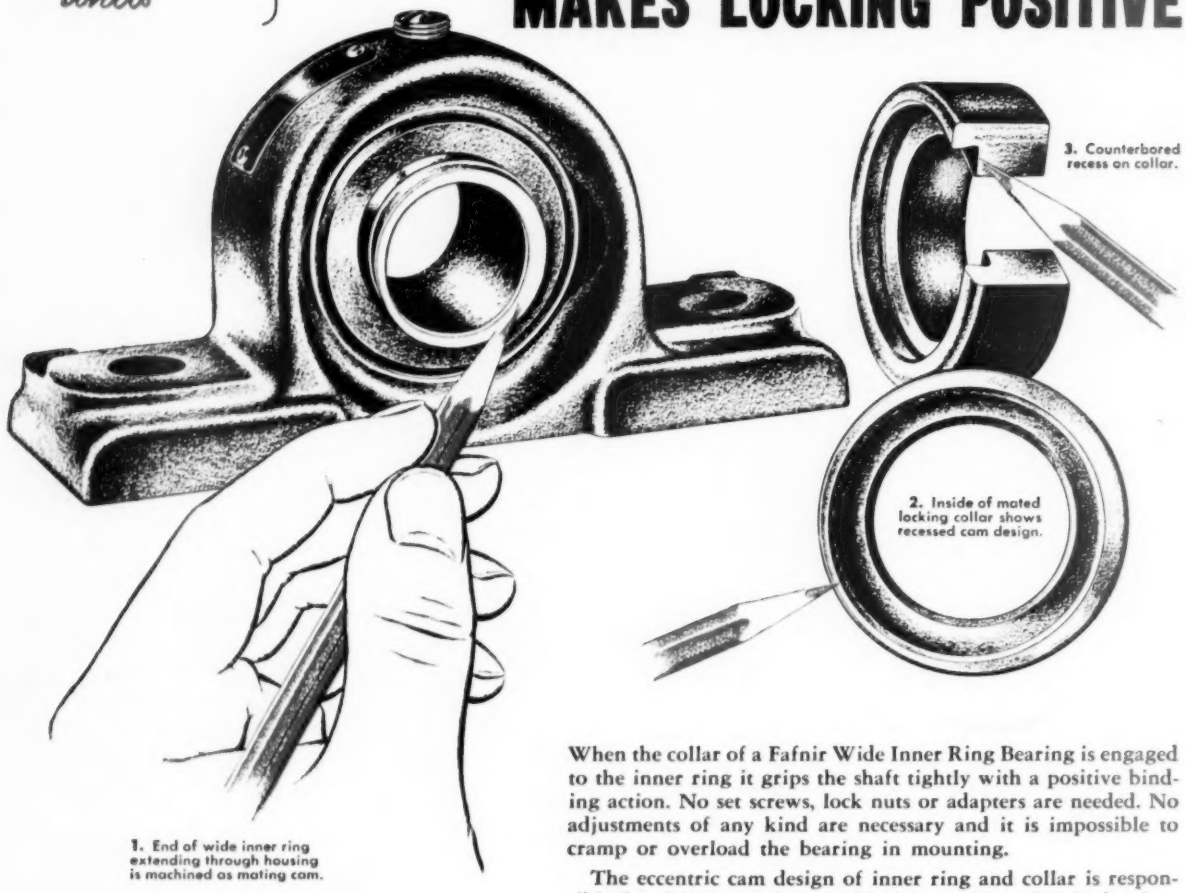
preference points on power transmission units

ECCENTRIC CAM DESIGN

of Inner ring and collar

MAKES LOCKING POSITIVE



1. End of wide inner ring extending through housing is machined as mating cam.

When the collar of a Fafnir Wide Inner Ring Bearing is engaged to the inner ring it grips the shaft tightly with a positive binding action. No set screws, lock nuts or adapters are needed. No adjustments of any kind are necessary and it is impossible to cramp or overload the bearing in mounting.

The eccentric cam design of inner ring and collar is responsible for this extremely valuable feature. It's a Fafnir development . . . tried and proven over the years. Shaft scoring is no longer a problem . . . and shaft slippage is out. The Self-Locking Collar transmits all thrust loads to the bearing.

For straight shaft mounting, the Fafnir Wide Inner Ring Bearing with Self-Locking Collar continues to rate "tops" as a feature of power transmission units. Every day it makes possible greater simplicity of mounting, economy of design, assembly and maintenance costs. For details call your Fafnir Distributor. The Fafnir Bearing Company, New Britain, Conn.

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. . . standard and heavy series

FLANGE CARTRIDGES
. . . standard and heavy series

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WIDE INNER RING BALL BEARINGS
. . . with Mechani-Seals

FAFNIR
BALL BEARINGS
MOST COMPLETE LINE IN AMERICA

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Machine chews stones— 100 tons an hour

A typical example of B.F.Goodrich improvement in rubber

THAT chunk of iron is a crusher that chews big pieces of limestone into little ones. Sometimes a parade of extra stones comes along, causing the iron giant to choke up for a time. Former belts used to stretch under the strain, then suddenly fly off the pulleys and crash right through the side of the building.

The frequent repairs and replacements of belts (and the wall panels) were costly. Then the company heard of a new B. F. Goodrich transmission belt, called Drivesall, that is especially built to resist stretching and to take sudden shocks and strains.

The new B. F. Goodrich belt was tried on the crusher. That was over a year ago. It not only does a better job of running the rock-chewing monster, but has already outlasted belts previously used. And because it's more flexible and has less stretch, it stays on the pulleys, keeps the machine running even when extra heavy loads hit the crusher.

This performance is typical, not an unusual case at all. It's the result of a policy at B. F. Goodrich — the policy of constant product improvement, of never considering a product "good enough." If you use rubber belting, hose or other industrial rubber products, it will pay you to check with your BFG distributor before you buy to see how you, too, can save money because of B. F. Goodrich research. *The B.F. Goodrich Company, Industrial & General Products Division, Akron, O.*

B.F.Goodrich
RUBBER FOR INDUSTRY

FACTORY
MANAGEMENT AND MAINTENANCE

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FOR 62 YEARS

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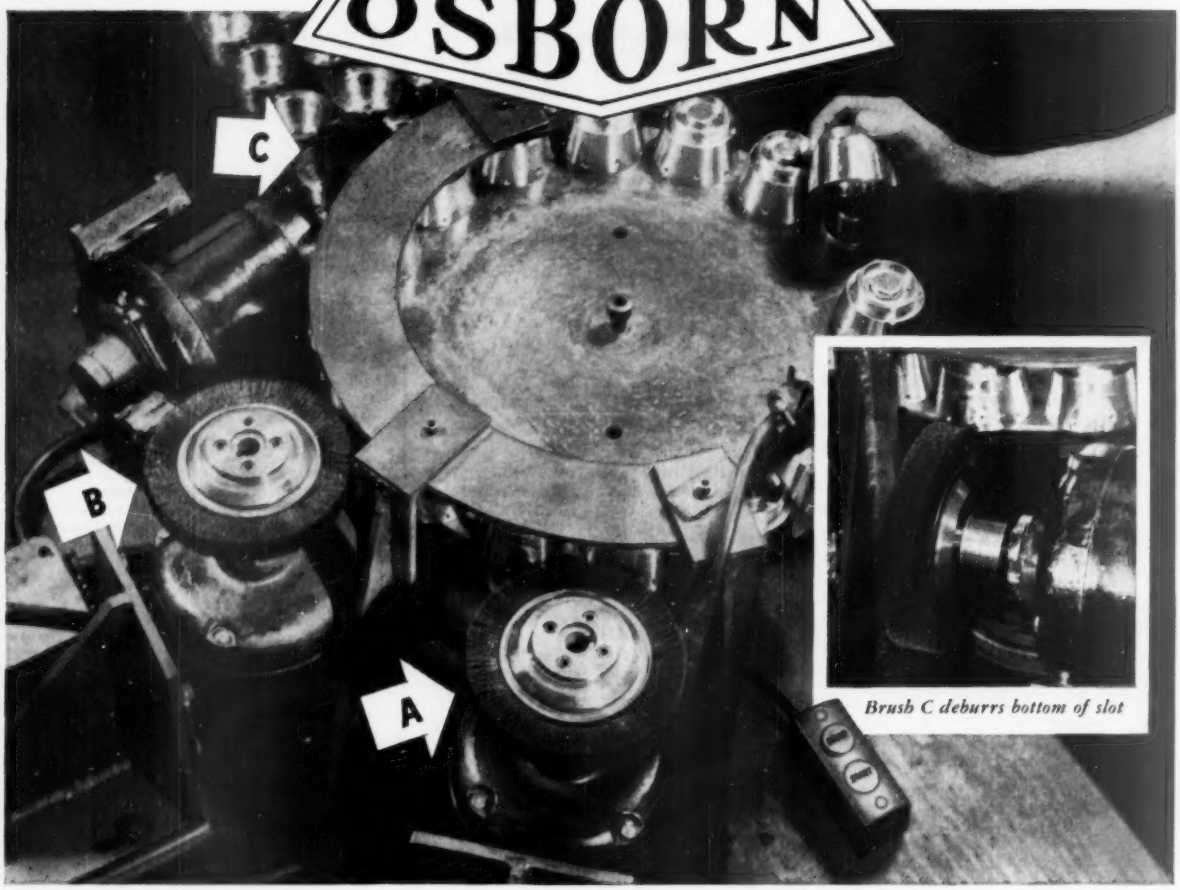

Brush C deburrs bottom of slot

Push-button brushing deburrs 1400 parts per hour

The Problem here was to remove feather burrs from a machined slot in aluminum ammunition components . . . *fast.* By a hand method, *output was only 360 per hour* and results were not uniform.

With the help of the **O**sborn **B**rushing **A**nalyst, the company built the rotating fixture shown above, equipped with three Osborn Master® Wheel brushes. Parts are placed on pins on clockwise-rotating table. Brush A, rotating clockwise, deburrs the corner of one side of slot. Brush B, rotating counterclockwise, deburrs the other side corner. Brush C deburrs the bottom corner. Slots come clean and smooth . . . *at a rate of 1400 per hour!*

Find out how power brushing can improve *your* product deburring, cleaning and finishing! Call the **OBA** or write *The Osborn Manufacturing Company, Dept. H-4, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

Brushes A and B deburr side corners. Brushes rotate at 3450 rpm.

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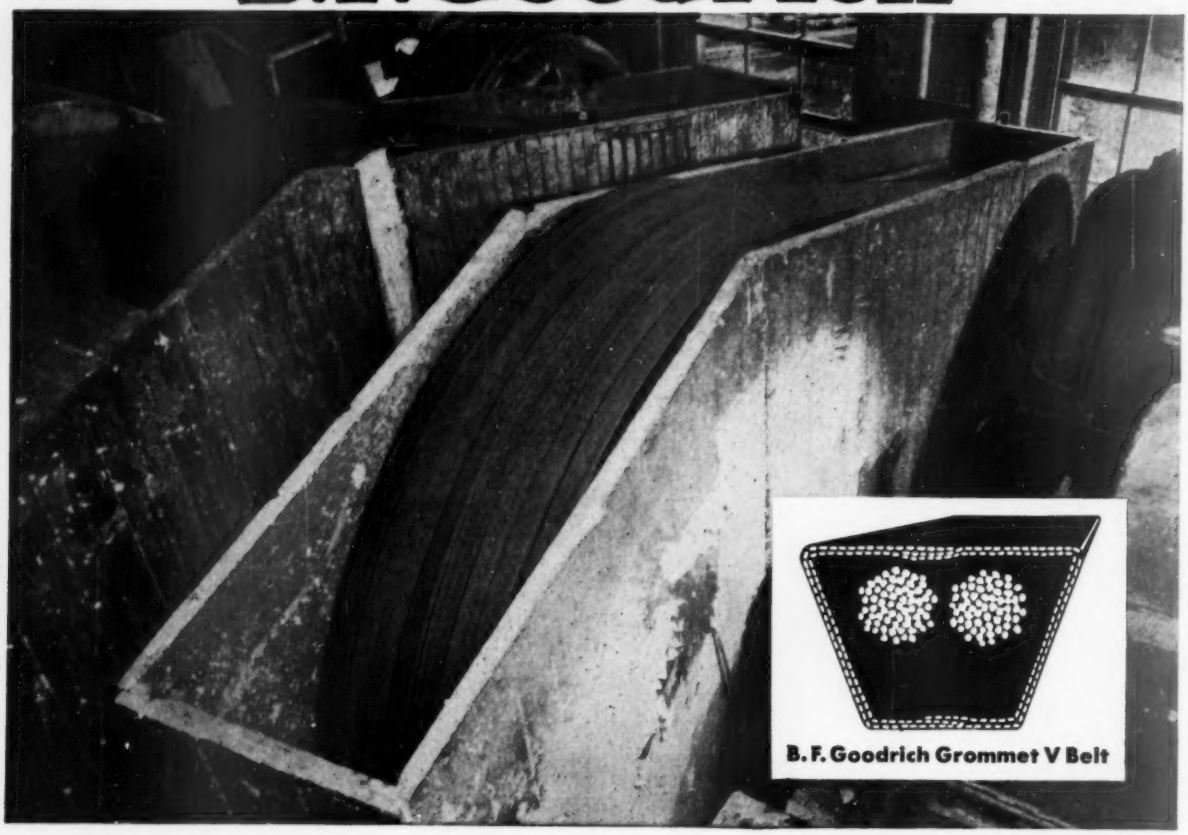
RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



11 to 1 service record proves B. F. Goodrich belts last longer

User reports 3-way saving with grommet V belts

ORDINARY V belts on these drives lasted only a year. They couldn't take the 24-hour-a-day service, the heavy loads. Covers would separate from the belt, flap around the drive, get caught in pulleys, then tear off completely. Then a B. F. Goodrich distributor recommended grommet V belts. It proved to be a perfect solution. Installed in 1941, both sets of grommet V belts have already lasted 10 times longer, and still look good for years' more service. Here's why BFG grommet belts outlast and outperform ordinary belts:

No weak spots

The section where cords overlap is the weak spot in ordinary belts. That's where 85% of belt failures occur. But in B. F. Goodrich grommet V belts this cause of belt failures has been eliminated. All of the cord material in a grommet belt is *concentrated* in twin grommets. These grommets are cord loops, made like giant twisted cables except that they're endless. There are no splices or overlaps—no weak spots to cause premature belt failures.

Better grip, less slip

Grommet V belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give ⅓ more gripping power, pull heavier loads with a higher safety factor. Because there is less slip, there is also less surface wear.

Save 3 ways

This company, like many others, is making a 3-way saving with grommet V belts. First, they save on replacement costs because grommet belts last longer. They save on production costs with no shutdowns caused by belt failures. And they save on maintenance costs because these belts need less attention. Yet the savings they make are clear profit because grommet belts cost not one cent more than ordinary V belts. Next time you need V belts, order *grommet* V belts from your BFG distributor. *The B. F. Goodrich Company, Industrial & General Products Division, Akron, Ohio. (Available in Canada).*

Grommet V-Belts BY
B.F.Goodrich
FIRST IN RUBBER

Baker 6000-lb. Fork Truck stacks Ford engine blocks in temporary storage. Next move is to engine plant.
THE BAKER-RAULANG CO.
1853
1953
THE BAKER-RAULANG CO.

New Ford Foundry speeds handling with BAKER TRUCKS

A sizeable fleet of Baker 6000-lb. capacity Fork Trucks helps maintain the production pace in the new Cleveland Ford foundry. The trucks are of the "FT" type, designed for 100% functional, efficient, safe, low-maintenance operation. They are used interchangeably on a wide variety of jobs, moving many materials that cannot be piped, conveyed or transported by other automatic methods. Most such materials are palletized for fork-truck handling.

They unload incoming bulk materials such as sea coal, bond, drums of oil and other liquids, tier them in storage or in areas near their points of use. They haul supplies to metal and molding departments and to other production operations. They haul finished products from ends of production lines to scales for weighing, and then to storage. Palletized engine blocks are taken from conveyors to temporary storage awaiting transfer to adjacent engine plant. They load cast flywheels onto highway carriers for shipment to the Ford Rouge plant.

write for *your copy of the "Baker Handling Library", a portfolio of case histories showing actual cost savings in foundries and other plants.*

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industrial trucks

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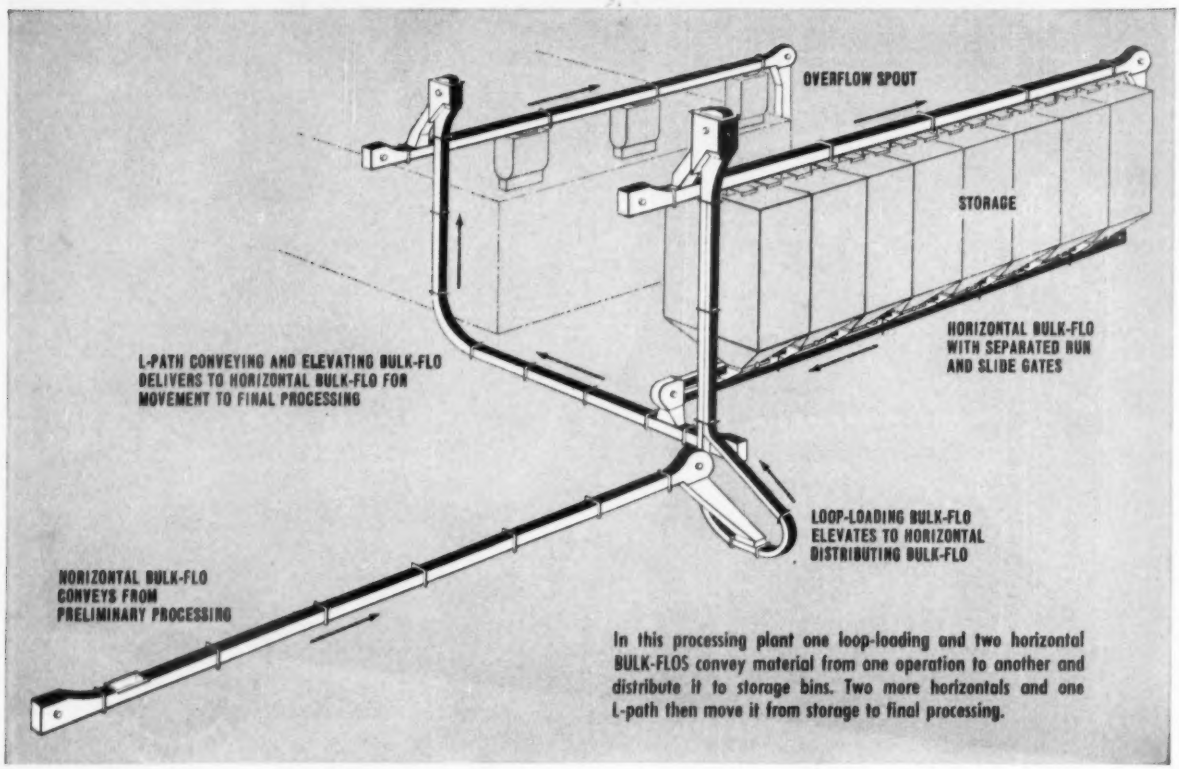
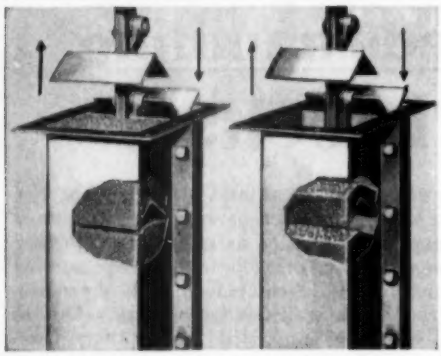
Link-Belt BULK-FLO combines feeding - conveying - elevating . . .


OVERFLOW SPOUT
STORAGE
HORIZONTAL BULK-FLO WITH SEPARATED RUN AND SLIDE GATES
L-PATH CONVEYING AND ELEVATING BULK-FLO DELIVERS TO HORIZONTAL BULK-FLO FOR MOVEMENT TO FINAL PROCESSING
LOOP-LOADING BULK-FLO ELEVATES TO HORIZONTAL DISTRIBUTING BULK-FLO
HORIZONTAL BULK-FLO CONVEYS FROM PRELIMINARY PROCESSING

In this processing plant one loop-loading and two horizontal BULK-FLOS convey material from one operation to another and distribute it to storage bins. Two more horizontals and one L-path then move it from storage to final processing.



Fully or partially loaded—Link-Belt BULK-FLO provides positive, gentle movement of material. Self-clearing through intermediate runs, it prevents contamination.

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NOW—with *one* fully enclosed assembly—you can replace several handling units in less space . . . at lower cost. BULK-FLO combines three functions in one, offers true versatility in bulk material handling.

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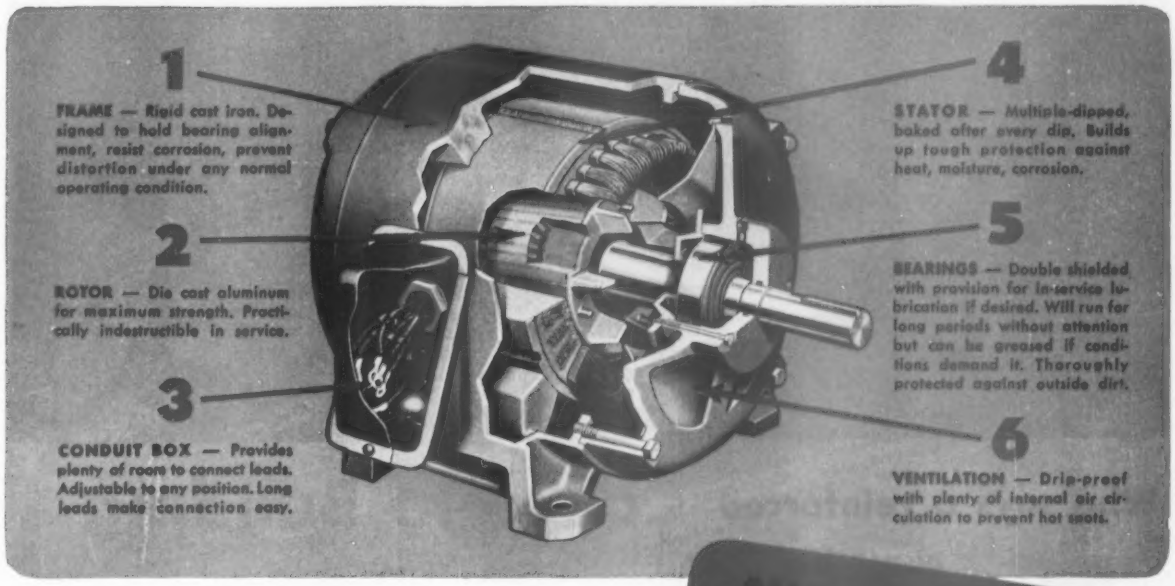
1
FRAME — Rigid cast iron. Designed to hold bearing alignment, resist corrosion, prevent distortion under any normal operating condition.
2
ROTOR — Die cast aluminum for maximum strength. Practically indestructible in service.
3
CONDUIT BOX — Provides plenty of room to connect leads. Adjustable to any position. Long leads make connection easy.
4
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5
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This building, a $3,920,000 loss, could have been saved with Grinnell Automatic ProtectoSpray

When the smoke cleared away . . . damage to this "fireproof" warehouse, and the 150,000 tires and tubes it contained, fell just short of the four million dollar mark! What a terrific price to pay for the lesson, already well-known to many, that "fireproof" buildings often serve merely as good stoves for flammable contents.

Grinnell ProtectoSpray could have prevented this costly fire. ProtectoSpray provides automatic fire protection for many types of special hazards, where standard sprinklers would be less effective. For instance: high piled storage; flammable liquids with flash points down to kerosene; wall or floor openings; oil-filled equipment; paint storage, or wherever a directional spray is needed.

Consider your own special fire hazard . . . then write, and we will be glad to send literature on the Grinnell Automatic ProtectoSpray. Grinnell Company, Inc., Providence, R. I. Branches in principal cities.

Grinnell ProtectoSpray attacks fire in three ways: 1) water vapor from the fine spray droplets dilutes the flammable vapors already present, to make them unburnable; 2) evaporation of the fine droplets removes heat from the solid or liquid source of flammable vapors, thus cutting down the fuel supply; 3) the evaporation of the droplets reduces the temperature of the fire gases, helping to prevent fire spread.

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75% LESS LABOR—In this cold storage plant four Elwell-Parkers plus drivers do as much work as 16 men did manually. Truck is delivering racks of fish directly into cold freezer.

ONLY 5% OF PREVIOUS MAN-HOURS—8 men with hand trucks took 3½ hours to load boxcar with 800-lb. rolls. Now truck operator and helper do job in 40 minutes!

TRUCK EQUIVALENT TO 30-MAN GANG—E-P truck with powered scoop transports bulk salt 7½ *times faster* than 4 men using wheelbarrows.

42 MEN DO 60 MEN'S WORK—That cut in the handling force at a grain mill was made after installing an E-P pallet retriever fork truck.

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Do you waste scarce and costly labor, moving materials by "muscle power"? If so, you are overlooking an opportunity to capitalize on Elwell-Parker's *inbuilt know-how*—proved effective in the typical labor savings illustrated above. Act today to meet the ever-growing manpower shortage . . . call in your *MAN* now. The Elwell-Parker Electric Co., 4023 St. Clair Ave., Cleveland 3, Ohio.

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POWER INDUSTRIAL TRUCKS
Established 1893

5th NATIONAL MATERIALS HANDLING EXPOSITION
MAY 18-22, 1953 PHILADELPHIA

When You Need Better Chain...

Get the Best

GET *Round* CHAIN

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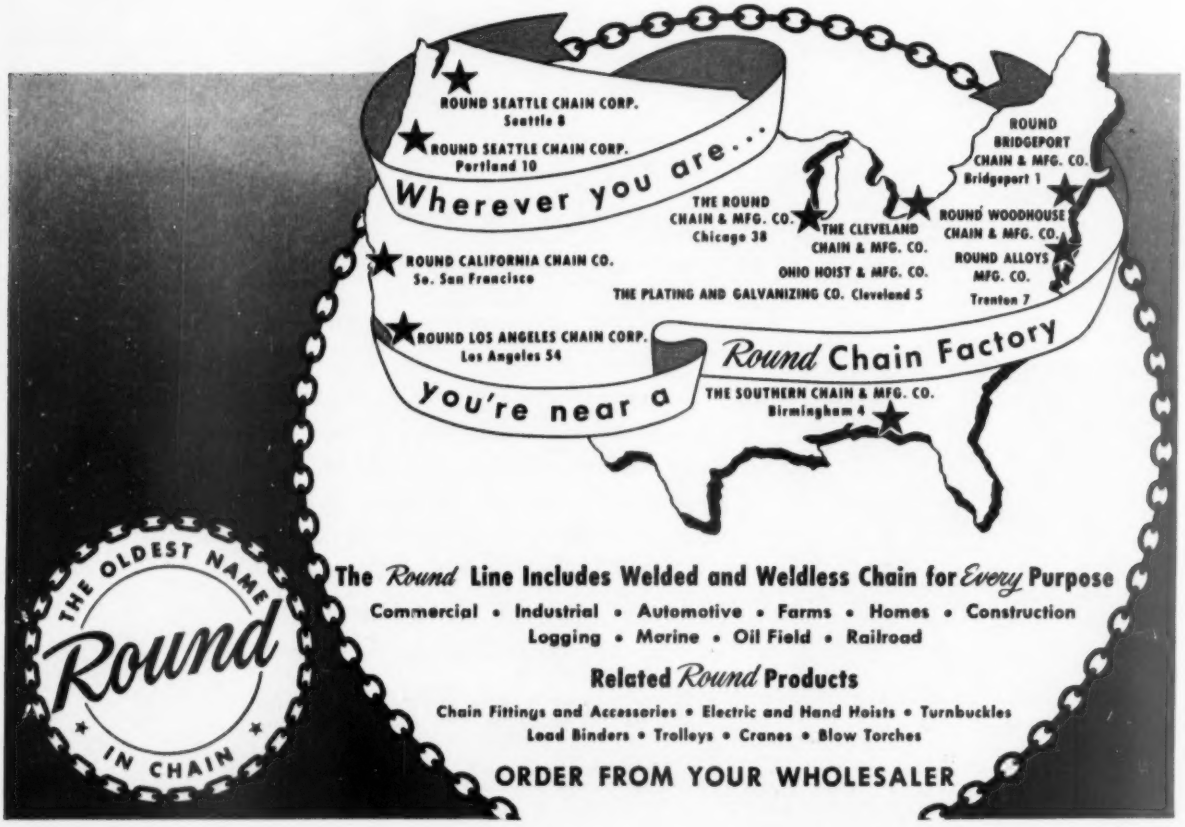
- Heat treating in special furnaces with automatic controls for maximum hardness and toughness.
- Producing at a rate consistent with quality control.
- Inspecting by microscope and spectroscope to check on physical composition and to detect flaws.

Next time you need chain, remember it's what is *inside* a piece of chain that determines the service and life you'll get from it. Today as always, the INside of *Round* Chain is the source of its superiority . . . is the factor that enables it to merit the term "BEST".

Next time, get the BEST. Get *Round* Chain.


ROUND SEATTLE CHAIN CORP.
Seattle 8
ROUND SEATTLE CHAIN CORP.
Portland 10
Wherever you are...
THE ROUND CHAIN & MFG. CO.
Chicago 38
THE CLEVELAND CHAIN & MFG. CO.
OHIO HOIST & MFG. CO.
ROUND BRIDGEPORT CHAIN & MFG. CO.
Bridgeport 1
ROUND WOODHOUSE CHAIN & MFG. CO.
ROUND ALLOYS MFG. CO.
Trenton 7
ROUND CALIFORNIA CHAIN CO.
So. San Francisco
THE PLATING AND GALVANIZING CO. Cleveland 5
ROUND LOS ANGELES CHAIN CORP.
Los Angeles 54
you're near a Round Chain Factory
THE SOUTHERN CHAIN & MFG. CO.
Birmingham 4
THE OLDEST NAME
Round
IN CHAIN
The Round Line Includes Welded and Weldless Chain for Every Purpose
Commercial • Industrial • Automotive • Farms • Homes • Construction
Logging • Marine • Oil Field • Railroad
Related Round Products
Chain Fittings and Accessories • Electric and Hand Hoists • Turnbuckles
Load Binders • Trolleys • Cranes • Blow Torches
ORDER FROM YOUR WHOLESALER

NOW

A NEW LINE OF Automatic Skylift Trucks

AT NEW LOW PRICES

New "Standard" Automatics bring famous, money-saving Skylift quality within price reach of every business

COMPARE THESE FEATURES

Capacities 1000 to 4000 pounds

*Monolift Model

FEATURE	BENEFIT	TRUCK A	TRUCK B	TRUCK C	AUTOMATIC
Only Automatic Skylifts have Silicone insulation	Max. protection against motor damage from overheating	—	—	—	✓
Ball bearing mounted carriage and upright rollers	Friction-free lift, less wear —minimum current draw	✓	—	—	✓
Full magnetic control with plug-proof protection	Safety—lowest maintenance	✓	✓	—	✓
Spur and Hypoid gear drive fully enclosed in oil bath	Maximum efficiency under all load conditions	✓	—	—	✓
Patented duolift rams with leakage return	Exclusive! Protects ram plunger from dirt, damage	—	—	—	✓
Highest lift speed of any electric truck	Does more work—faster	—	—	—	✓
Heavy section rolled manganese alloy steel uprights	Better wearing quality, proper flange strength	✓	—	—	✓
Hydraulic Safety Fuse	Locks load in position if line ruptures	—	—	—	✓
Greatest accessibility for maintenance	Minimum down time, lowest maintenance costs	—	—	—	✓

Now, for the first time, Automatic makes available to industrial truck users a new line of battery-operated Skylift fork trucks *at new low prices*...with MORE MONEY-SAVING FEATURES than any other electric truck.

Built for Trouble-Free, Heavy-Duty Service

These rugged, new "Standard" Skylifts... built to give long, repair-free service, maximum maneuverability and smooth, fast, dependable operation...are equalled by no other truck for quality, price and performance.

Before you buy any lift truck, get the complete money-saving facts on the amazing materials handling savings these new Automatic "Standard" Skylifts will bring to *your business!* **2000 lb. model only $3575.00* F.O.B. Chicago**

*PRICE IN U.S.A.

GET ALL THE FACTS—MAIL THIS COUPON TODAY

Automatic®

LARGEST EXCLUSIVE BUILDER OF ELECTRIC INDUSTRIAL TRUCKS

Automatic · 39 West 87th Street, Dept. D-3 Chicago 20, Illinois

Without obligation, please send me full details and prices on your new line of low price "Standard" Skylift trucks.

Company Name.....

By.....*Title*.....

Address.....

City.....*Zone*.....*State*.....

It's Here!
The Completely New, Low-Cost
OSTER
ELECTRIC "SEWER MASTER"
It's Powerful! It's Versatile! It's a Necessity for Maintenance Departments!

THE all new Oster "Sewer Master" is a powerful, low-cost machine. It weighs less than 100 lbs. and clears obstructions 100 ft. or more from the sewer entrance. Large, rubber tired wheels make it easy to move up and down stairs and to the job.

Cutting tools to remove roots, grease, chips and many other obstructions are easily attached to the coiled spring "snake" which is securely held and revolved at any convenient distance from the sewer entrance by the revolving chuck jaws of the "Sewer Master".

A snap switch reverses the powerful motor on the "Sewer Master" so the "snake" can be revolved in either direction to assure easiest removal of toughest obstructions. Complete control of the "snake" action is maintained through the convenient control lever.

FACTS about the OSTER "SEWER MASTER"

The new Oster "Sewer Master" can do a tough job at minimum cost. For complete facts call your local Oster Distributor, or let us send you his name and a compact booklet on the new Oster "Sewer Master".

THE OSTER MANUFACTURING CO.
Main Office and Factory:
3039 East 61st St., Cleveland 3, Ohio

1893 • CELEBRATING 60 Years Leadership in the Threading Industry • 1953

ANACONDA FORUM
for the Electrical Industry

THE IMPORTANCE OF
PRODUCTION METHODS ANALYSIS
IN INDUSTRY

by Robert G Ely, Vice President
The Connecticut Light and Power Company

LOWER production costs, always a major concern of industrial management, have, due to inflationary pressures during the past several years, become the vital element of survival in our competitive markets. Fortunately better production methods, coupled with enlightened depreciation practice that provides for prompt replacement of obsolescent productive equipment, enable our industrial customers to stay in the race. And fortunately, America's engineers are past masters at continually developing better production methods. The pioneering work of Dr. Frank Gilbreth in time and motion study laid the groundwork for a fascinating field of engineering encompassing the fundamentals of continued profitable operation in any industrial activity—that of Production Method Analysis.

FROM RAW MATERIAL TO FINISHED PRODUCT

Production Method Analysis studies the operation from raw material to finished product—the method of handling materials, the sequence of operations and their logical physical relationships, the individual operators and their activities. It also studies bottlenecks of production, such as poor or obsolete equipment, inadequate wiring with its consequent voltage problems and decreased production rates, inadequately trained personnel, or lack of proper tools. In short, Production Method Analysis breaks down apparently complex operations into their simple component parts. From such analyses and the subsequent use of modern, high-speed, automatic machines properly tooled and in proper sequence, along with effective materials handling and efficient personnel who know their jobs, comes the healthy industrial employer who is so vital to the well-being of the community and, incidentally, to the utility serving that community. And therein lies our very real interest in Production Method Analysis.

INDUSTRIAL PAYROLLS VS. UTILITY INCOME

There is no mathematical sleight-of-hand involved in developing the relationship of industrial payrolls to utility income in any community or group of communities. Unable to pull up poles and move to where the grass may look greener, and confined to its franchise territory in its quest for new business, the utility's prosperity directly reflects the general prosperity of its service area. Lower production costs, therefore, become of vital concern to us as well as to our customers. Production Method Analysis as a tool in increasing production rates and reducing unit costs has therefore become part of our vocabulary, part of our thinking, part of our program of doing our utmost to help our manufacturers maintain and improve their competitive positions within their own industries.

ELECTRICAL EQUIPMENT PLAYS A PART, TOO

Our allies in the electrical equipment field have an important part in this program too. This is for the reason that better production methods depend on the availability of a sufficient supply of power in the right place at the right time, ready for application to the job of increasing the effectiveness of manhours through efficient transformation into mechanical or heat energy for the accomplishment of industrial tasks. Generating stations, transmission and distribution systems, adequate plant wiring and well engineered utilization equipment are all necessary parts in the over-all picture of industrial and community growth and health. All who have a part in the supply of these facilities strengthen the backbone of better production methods.

ANACONDA JOINTING KITS prevent the possibility of inadequate materials . . . keep stocks fresh and readily available for fast withdrawals. Illustration shows how complete these kits are—right down to a handy checklist of materials.

ANACONDA CABLE ACCESSORIES

A complete line—engineered by power-cable experts—is available in increased quantities.

At Anaconda, the increase in demand for cable accessories is being met by increased production. The complete line—with many exclusive features—consists of the following:

Potheads (capnut, switchgear, transformer, disconnect and through types), featuring unmatched interchangeability of parts.

Unit Packages of Jointing Materials. These kits contain everything needed to make a joint.

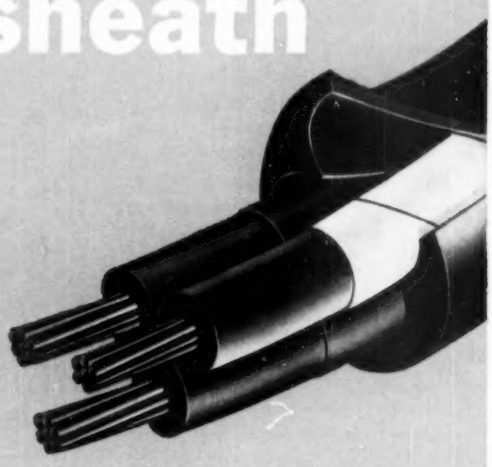
Filling Compounds. Balanced compounds mean greater stability.

Cable Paints and other miscellaneous accessory items.

Bring your cable and cable accessories problems to your Anaconda Representative.

Durasheath

the *all-purpose* ANACONDA Cable for both power and lighting services



Durasheath's* tough neoprene jacket stubbornly resists electrolysis, corrosion, temperature extremes, cutting, abrasion, impact, flame, oil, grease, moisture and most soil acids and alkalies.

Run it overhead, in ducts, or buried underground—or all three in one continuous run.

It's flexible, easy to handle, economical to install; made in single or multi-conductor construction.

Your nearest Anaconda Sales Office or Distributor can show you why it's good business to install this versatile, all-purpose cable. Just ask them.

*Trademark

TEN BASIC RULES FOR INDUSTRIAL WIRING

BY FRANK AIME, veteran electrical engineer of Anaconda Wire & Cable Company.

Successful operation of an industrial plant depends on the quality of its electrical distribution system. These rules should help in setting up a well-planned system for both large and small plants:

1. Design the system within supply limitations.
2. Locate supply near electrical load centers.
3. Know your load requirements.
4. Let requirements of processes, production and relative importance of the major characteristics of distribution systems determine distribution system type.
5. Select and arrange feeders and equipment so that interruptions never occur more than the process will allow.
6. Select all components from source to load for reasonable future growth.
7. Don't be limited by National Electric Code figures for conductors, conduit and protection which are minimum and primarily for safety.
8. Use load centers when feasible.
9. Select cables with best all-around characteristics for your condition.
10. Aim always for production efficiency, quality and safety.

ANACONDA RESEARCH AT WORK

How a new problem meant a new product

The problem? Loads had outgrown duct space and duct sizes of lead-covered cables. Cables had to be run hotter and under more severe physical difficulties. Cable *sheaths* were failing before *interiors* . . . cable life was limited.

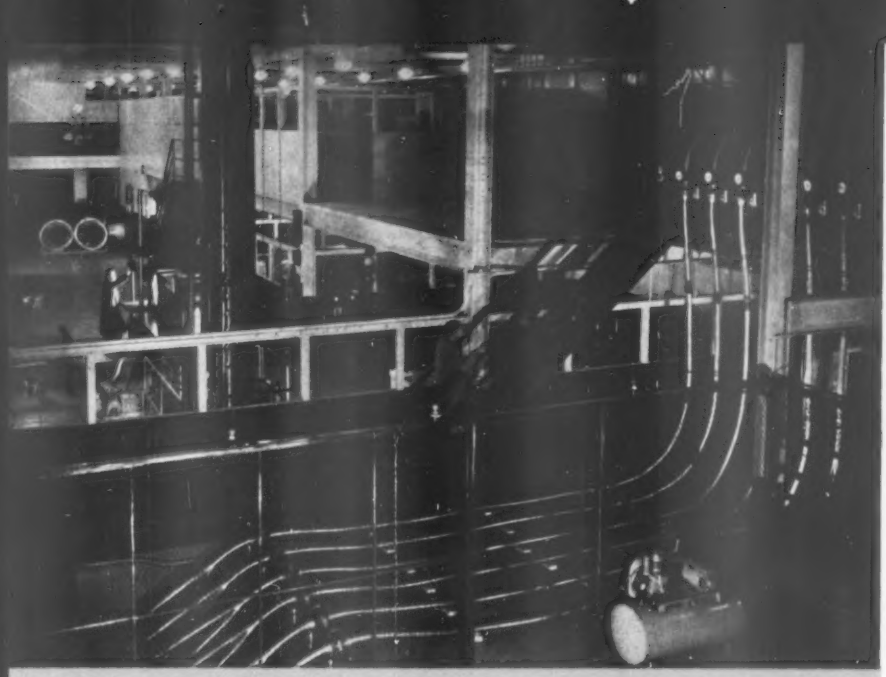
Anaconda research set out to find the answer. Hundreds of sheath alloys were tested. The one finally selected promised far better performance. Called ANACONDA F-3† alloy-lead sheath, it has a high burst strength and a low creep rate . . . resists bending and does not age-harden.

Once again, Anaconda's planned program of research solved a new problem with a new product. Yes, research like this pays off . . . in cable that serves you better!

RESEARCH IS ANACONDA'S BUSINESS, TOO!

†F-3 Arsenic-Lead Alloy (U. S. Patents 2,300,788, 2,375,755, 2,504,600 and 2,570,501) Reg. U. S. Pat. Off.

ANACONDA®



CYCLIC AGING TEST. Here's one method Anaconda Engineers use to learn how lead-covered, paper-insulated cables stand up. In this laboratory, cables are loaded under conditions similar to daily load cycles in the field, but at higher temperatures and voltages. Result: Anaconda Engineers get the facts fast . . . know what can happen years hence . . . and can give you much more reliable performance data.

WHY THIS MAN'S JOB MEANS BUILT-IN QUALITY IN THE CABLE YOU BUY

THIS IS ED GITTLESON, Anaconda's Chief Inspector and Manager of Quality Control.

Ed knows that to make a good product and sell it at the lowest possible price, quality must be built in right from the start. That's Ed's job—to see that it's done from raw material to final shipment. Ed has based Anaconda's control program on principles of statistical quality control that assure you not only of *greater* uniformity, but of a *higher level* of quality as well. You can be sure that every Anaconda product more than complies with your requirements.

No busduct system is truly flexible without this

New ANACONDA® Powerduct Cable

It's the only nonmetallic-armored busdrop cable UL approved for this hard use; cuts cost of relocating machines.

Even if you have a modern busduct system, it may be flexible only so far as it goes. You may still have to rip out permanent or semi-permanent wiring every time you rearrange important machines. That's costly.

Why not match your busduct system with money-saving ANACONDA Powerduct Cable . . . approved by Underwriters' Laboratories, Inc., for busway branches under section 3646, 1951 National Electric Code?

Powerduct Cable is much cheaper to install than conduit. It handles easily. Grips prevent cable creep. No time is lost. You get circuit capacity at any point for any load at any time. Coil (see illustration) makes local changes easy.

Its tough jacket takes heavy mechanical abuse, is flame-retardant, won't fray. Cold-flow is no problem. Cutting compounds, oil, acid, water, grease won't harm it.

Plan now to add flexible Powerduct Cable to your busduct system. Be sure that you insist on the ANACONDA Trademark—your positive proof of UL approval for this use.

the right cable for the job

SHORTS THAT MAKE SENSE

PRODUCTION TOOL. Good lighting is important in any plant. With it—high quality, profitable production and fulfilled schedules are possible. Without it—spoilage, reduced efficiency, lowered quality control and poor morale may send costs skyrocketing.

ADEQUATE CIRCUITS. A lighting system is no better than the circuits that serve it. Lamp efficiency, for instance, depends on operation at rated voltage. Make sure your circuits are adequate.

PLANNED SYSTEM LAYOUT. Lack of planning never pays off. A well-designed system always costs less than a poor one. Plan for tomorrow and you cut tomorrow's costs *today*.

TOMORROW'S LIGHTING NEEDS. Many plants install lighting circuits in working areas for an ultimate of two times present lighting intensity. Play smart and follow suit. You won't be caught with your lighting down.

CURRENT RATING. No one value of current-carrying capacity (amperes) can be assigned to any one size and design of cable. Installation and method of operation must be considered.

CABLE TERMINATIONS. Moisture, like death and taxes, plays no favorites. In making cable terminations, it pays to keep this in mind—even at low voltages. There tightness against moisture is just as important as for higher ratings. Yet it's here that failures are far more frequent. Probably due to the feeling that here anything will do in the way of terminating the cable.

OVERHEAD VS. UNDERGROUND. For appearance' sake only, overhead distribution systems are often replaced by more expensive underground systems. But it's entirely possible such a change will also result in a lower annual cost. Reason: freedom from damage by trees, wind, sleet, ice, etc. Reliability is improved.

"LIVE"
INSULATING
OIL

Heat and electrical stress produce deterioration products which eventually sign the death warrant for insulating oil. Carbon black keeps such oil "alive." It minimizes and removes deterioration products and keeps them outside the field of the dielectric. It continually purifies and stabilizes the oil . . . keeps it clean.

Only ANACONDA Type CB* Power Cable utilizes this phenomenon. Result: greater stability and longer life. This tested paper cable may be obtained with special carbon black binder which adds resiliency, yet possesses adequate strength. A further improvement, F-3** Alloy-Lead Sheath, triples sheath life by its high resistance to slow-bending fatigue, creep, burst and abrasion.

If you're not using Type CB Power Cable, you aren't getting as much service out of your paper cables as you should. We suggest you get the full story from your nearest Anaconda Sales Office.

* CB—Carbon Black (U. S. Patents 2,102,129, 2,405,853) Reg. U. S. Pat. Off.

** F-3—Arsenic-Lead Alloy (U. S. Patents 2,300,788, 2,375,755, 2,504,600 and 2,570,501) Reg. U. S. Pat. Off.

FOR FURTHER INFORMATION about any product mentioned in the pages of this advertisement, see your Anaconda Representative . . . or write to *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

ANACONDA®

TODAY'S HEADQUARTERS FOR WIRE AND CABLE

MAKERS OF

building, barn, machine tool, control and communication wire • service and overhead distribution cables, bare and weatherproof including ACSR • portable cords and cables • power and bus-drop cables • mine, bridge, aerial, underground, duct, network and submarine cables • parkway, airport and street-lighting cables • station, apparatus and vertical-riser cables • magnet wire • copper, aluminum and copperweld conductors • wire and cable accessories.

Six bucks to repair a six-buck item?

Too much? Maybe so, but it's happening all the time. At today's maintenance rates of $3 to $4 an hour, regrinding a valve seat isn't a small job any more. Nor is repacking a valve, or installing a new one. Even replacing an ordinary pipe fitting isn't the same job it used to be.

You see, piping maintenance labor has gone up along with all other costs. That's why any excessive maintenance can quickly equal or exceed equipment cost.

You'll meet this problem best by insisting on the most dependable quality in piping materials. By having greater assurance they will stay on the job longer, need fewer repairs, cause less trouble. By standardizing on Crane Quality—the choice of thrifty buyers in every industry.

Crane Co., *General Offices:* 836 S. Michigan Ave., Chicago 5, Ill. *Branches and Wholesalers Serving All Industrial Areas.*

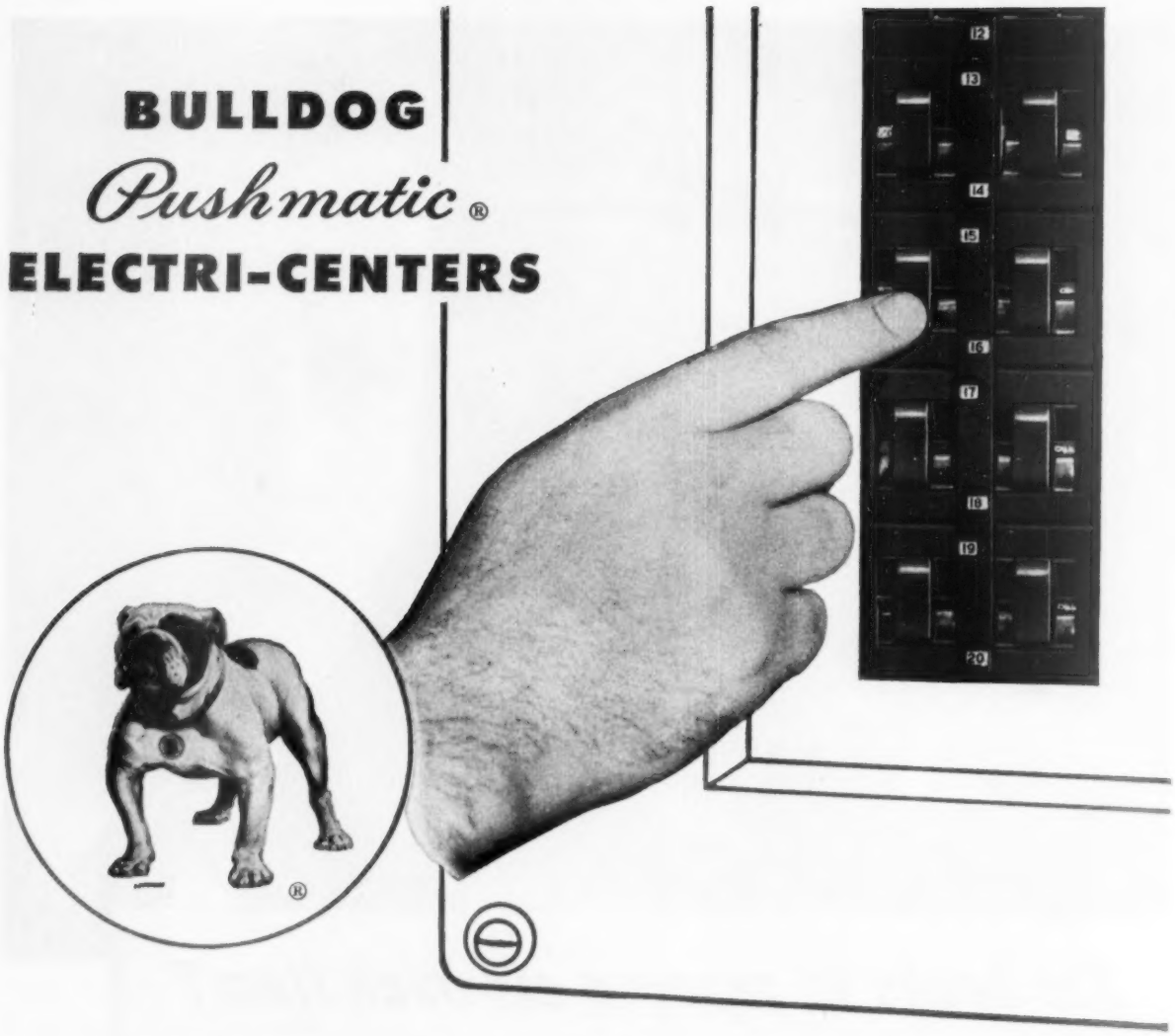
CRANE

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

BULLDOG

Pushmatic®

ELECTRI-CENTERS



Thoroughbreds on Guard!

The clean, neat exterior of BullDog Pushmatic Electri-Centers is truly indicative of their thoroughbred quality and safe, dependable operation.

Only Pushmatics give you simple-to-operate push-button control. On guard over electrical equipment like a row of sentinels, Pushmatics let you easily see whether the circuit is on or off. When a short or overload occurs, the push-button snaps forward, automatically breaking the circuit, and word "OFF" appears. Once the trouble has been remedied, simply *push the button,* and service is instantly restored.

BullDog Pushmatic Electri-Centers are available in sizes from 2 to 42 circuits, to fill every industrial, commercial or home requirement. Write today for free Bulletin PM-355 giving complete information. BullDog Electric Products Company, Dept. FM-43, Detroit 32, Michigan.

© BEPCO

BULLDOG

ELECTRIC PRODUCTS COMPANY

If you want a better looking, longer lasting, lower cost maintenance painting job

Don't Starve the Brush!

It makes a big difference . . . *a great big difference* . . . as to what you feed the brush. You can buy cheap paint . . . save money per gallon . . . but man, oh man, how much *more* paint you have to buy! And of four times greater importance . . . because labor represents 80% of the total cost of a painting job . . . you'll pay much more for putting it on the wall.

That is why we say over and over the years . . . don't starve the brush. Use Barreled Sunlight paint.

You might have to pay a few more pennies per gallon. But you can thin Barreled Sunlight more. You buy less paint. And you'll make savings . . . *big savings* . . . in labor.

Barreled Sunlight goes on easier . . . covers more area per stroke . . . gives you more yardage per gallon and in less time or fewer costly man-hours. What's more it hides better, lasts longer, stretches out the years between repaintings.

This can be proved easily and quickly with a simple, on-the-wall test between Barreled Sunlight and any other paint you're now using. Write, and your nearest Barreled Sunlight representative will gladly show you how.

BARRELED SUNLIGHT PAINT COMPANY, 2-D Dudley St., Providence, R.I.

Barreled Sunlight Paints®

Ask about Barreled Sunlight's "Engineered Color" — partner of light in creating better seeing and working conditions.

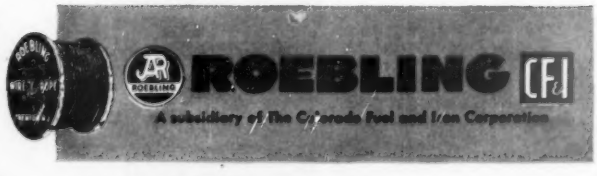
IT ALWAYS COSTS MORE NOT TO PAINT!

For over half a century the symbol of quality and dependability among paint buyers for leading industrial, institutional and commercial buildings

"There's only ONE reason!"

IT'S JUST THAT SIMPLE. There's only one reason in the world why 2 out of 3 materials handling men prefer Roebling wire rope and slings... *they cost a lot less on the job than any others.*

For top efficiency and economy, call your nearest Roebling office for a Field Man. He'll suggest the best ropes and Flatweave and All-Purpose Slings for your work.



JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5535 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

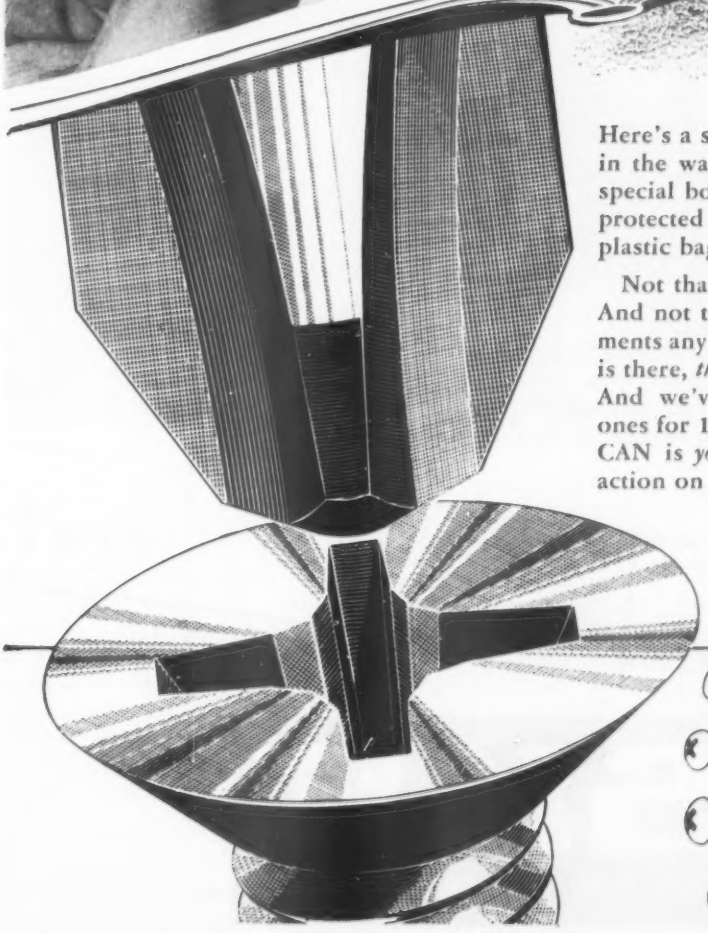
THE AMERICAN STORY

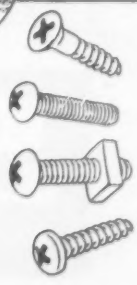
CHAPTER SEVEN

Beyond the Line of Duty

Here's a shining example of what American can do in the way of special services to customers . . . a special bolt ground to a mirror finish . . . and then protected against damage by a special, *individual* plastic bag.

Not that American is in the packaging business. And not that American is soliciting special assignments any more than anyone else. But when the need is there, *the service and resources are there to meet it.* And we've been licking our share of the tough ones for 115 years . . . another reason why AMERICAN is *your* PHILLIPS HEADquarters. For fastest action on your fastening problems, write:



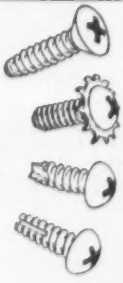


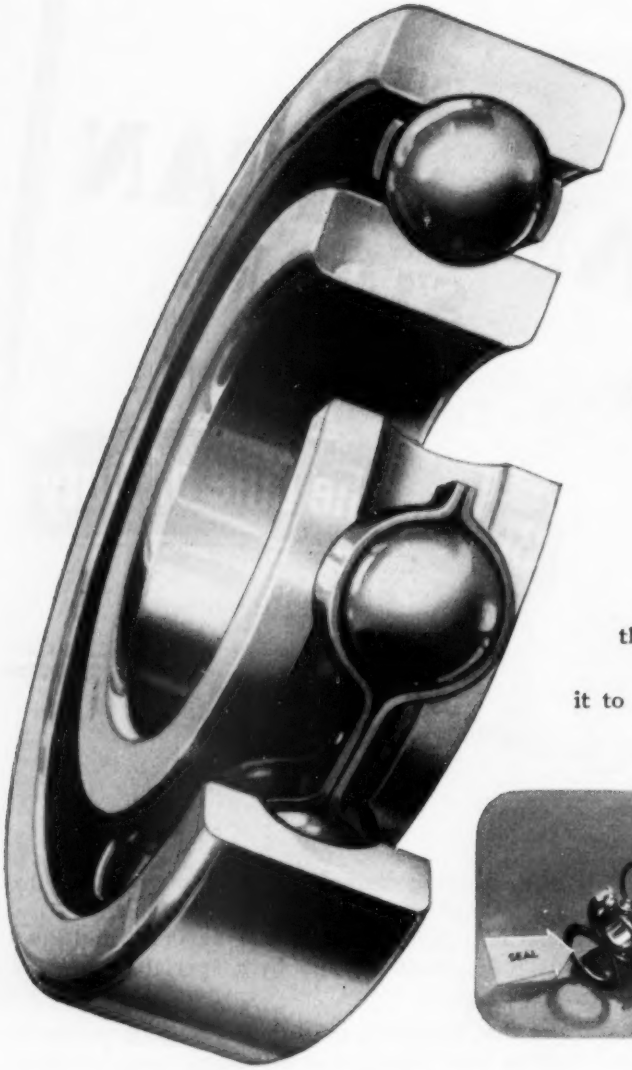
AMERICAN SCREW COMPANY

PHILLIPS HEADquarters

WILLIMANTIC, CONNECTICUT

Main Office & Plant
Willimantic, Conn.
Office & Plant, Norristown, Pa.
Office & Warehouse, Chicago, Ill.





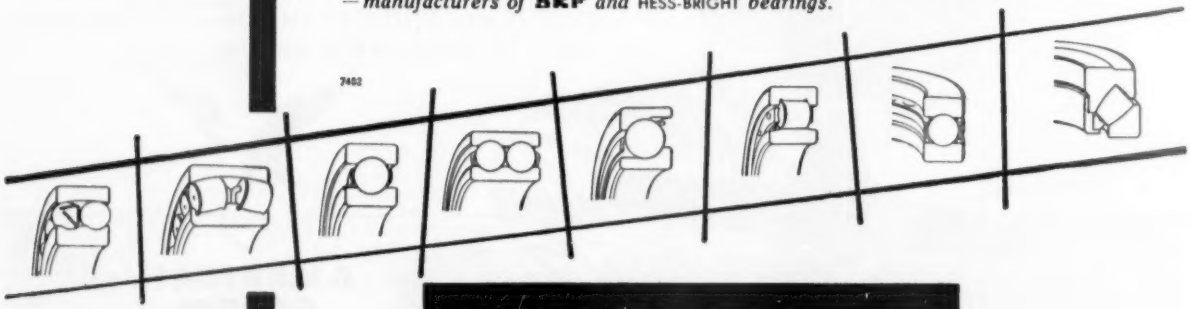
where shafts must turn fast you'll find SKF SINGLE ROW DEEP GROOVE BALL BEARINGS

Look at the *contact* between the balls and the deep, continuous groove in each ring of this SKF bearing—contact that enables it to sustain not only radial load, but substantial thrust load, even at very high speeds.

Look further—SKF Single Row Deep Groove Ball Bearings are available with *any combination* of DuPont Fairprene seals, shields and snap rings: shields for excluding dirt; seals for retaining lubricant; snap rings for holding the bearing in lateral position in its housing.

Like all SKF Bearings, they're held well within established tolerance limits, tested for radial runout, carefully cleaned, protected from rust, strongly packaged.

Many SKF bearings are serving industry everywhere because SKF's unmatched Field and Home Office engineering service helped product designers *put the right bearing in the right place.* **SKF INDUSTRIES, INC.,** PHILADELPHIA 32, PA. —*manufacturers of* **SKF** *and* HESS-BRIGHT *bearings.*



SKF'S COMPLETE LINE OF ANTI-FRICTION BEARINGS, PLUS SKF ENGINEERING CO-OPERATION, HELPS YOU PUT *THE RIGHT BEARING IN THE RIGHT PLACE.*

SKF®
BALL AND ROLLER BEARINGS

Triple-tier stacking of a 2,088-pound load of heavy chemicals at Westvaco Chemical Division, Carteret, N. J.

TOWMOTORS IN ACTION IN U. S. INDUSTRY

Tuck 'em in snug...

Stretch both storage capacity and your operating budget . . . by stacking extra-large loads extra tiers higher. That's just one of many ways that widely adaptable Towmotor takes the hobbles off your materials handling routines for greater efficiency. Any one alone totals up savings that pay for Towmotor many times over. Methods which make these savings a reality are described in new book titled "Man-Hour Thieves." Write for your copy, and name of your nearest Towmotor Representative, to: Towmotor Corporation, Div. 504, 1226 E. 152nd St., Cleveland 10, Ohio.

Be Sure To See the Towmotor Exhibit at the 5th National Materials Handling Exposition starting May 18, 1953.

TOWMOTOR
THE ONE-MAN-GANG®

FORK LIFT TRUCKS AND TRACTORS

SINCE 1919

TOWMOTOR ENGINEERED FOR QUALITY PRODUCTION

The best way to keep Power Distribution in step with Plant Expansion!

Rock Hill Printing and Finishing Company had a power problem that plagues many industries today. Their rapidly expanding plant was simply growing away from its power source. The resulting overextension and overloading of feeders created conditions that always hamper production: excessive line losses . . . poor voltage conditions . . . frequent service interruptions. But note how effectively a Westinghouse Power Center—serving as an additional distribution point—solved the problem . . .

> "After the installation, we found voltage conditions improved as much as 10 percent . . . line losses reduced 5 percent . . . and unnecessary tripping out completely eliminated.
>
> "Remarkably little time and engineering effort were required in making the installation. We found it almost as simple as plugging in an appliance. And we saved nearly 2000 feet of cable as a result of shorter, low-voltage runs."

This Westinghouse Dry-Type Power Center will enable this user to realize even further savings. The elimination of vaults, oil conditioning and testing, promises a saving in maintenance, virtually eliminates fire hazard, and provides greater safety for operating personnel. Westinghouse Power Centers offer these same advantages to you. J-60777

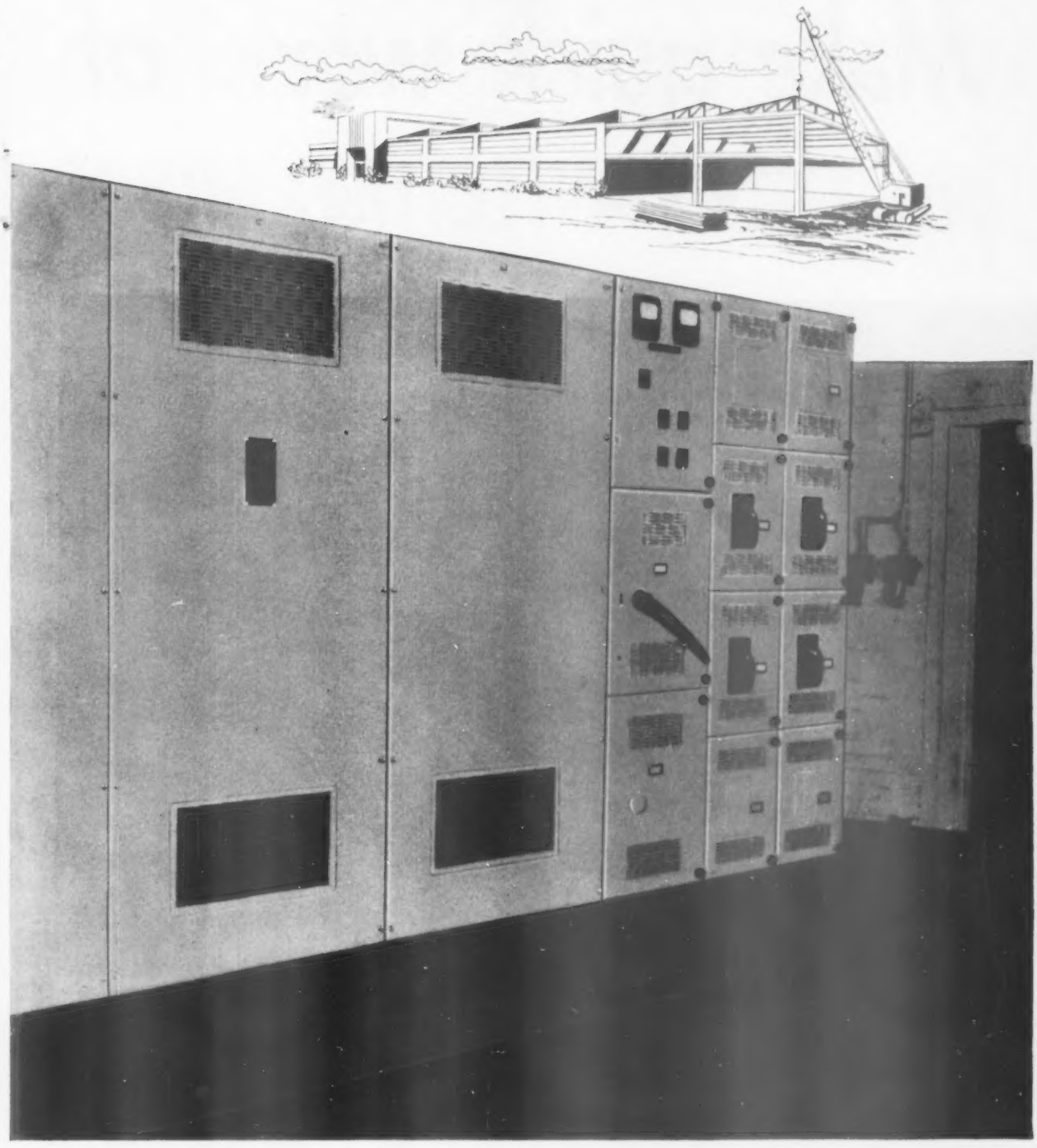
GET THE COMPLETE STORY

Westinghouse Power Centers are the key to efficient power distribution. They offer better service continuity, greater flexibility, better regulation—all the things that contribute to power distribution economy. Most important, they provide the simplest, lowest cost way of attaining the power system that best meets your operating requirements.

Booklet B-4162 covers Westinghouse Power Centers in detail. Booklet B-4045 discusses various types of plant distribution systems wherein Power Centers offer maximum advantage. For your copies contact your Westinghouse Representative or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

YOU CAN BE SURE... IF IT'S Westinghouse

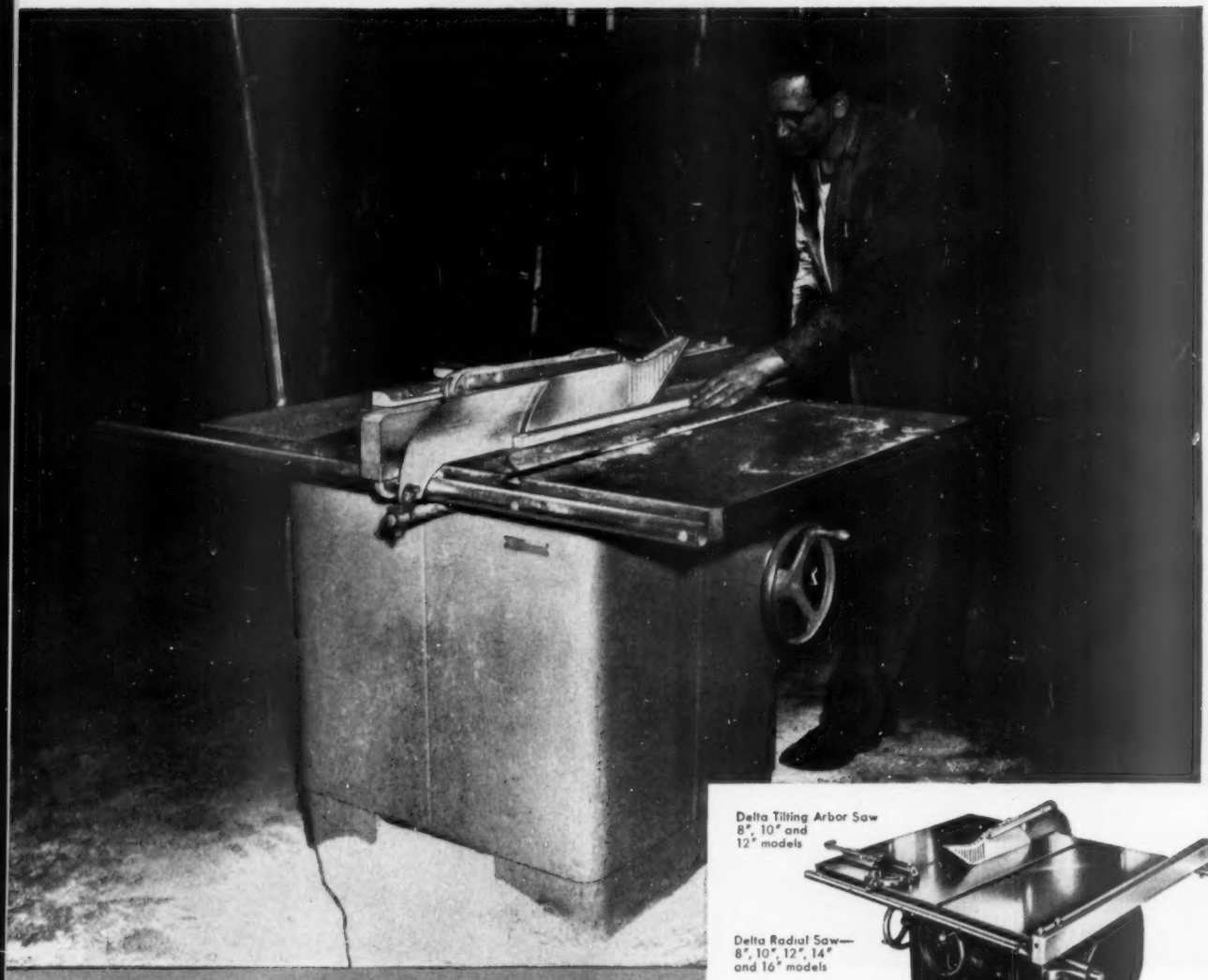
POWER CENTERS



AT ROCK HILL PRINTING AND FINISHING COMPANY

Rock Hill, S.C... this Westinghouse Dry-Type Power Center is part of a distribution system as modern as the plant additions it serves. Located near the center of load it makes possible shorter secondaries, lower line losses, better regulation.

Make quick work of put DELTA TILTING ARBOR



HOW CROMPTON AND KNOWLES DOES IT

Crating for export requires a great deal of care by Crompton and Knowles Loom Works of Worcester, Massachusetts. Each loom is bolted to a wooden frame and braced so it will not shift in the crate. The inner box is then built up around it. This is covered with moisture resistant paper which is, in turn, covered with another layer of boards forming the outer box. Ripping operations are performed with a Delta 12" tilting arbor saw, and the Delta radial saw follows with cut-off jobs.

DELTA
MILWAUKEE

DELTA QUALITY MAKES THE DIFFERENCE

difficult crating operations— and DELTA RADIAL SAWS on your shipping room team!

Difficult crating operations can cost you a lot of money. As a matter of fact, even simple jobs can be the source of high indirect labor costs.

Incentives today, have speeded plant production . . . fast cutting Delta power saws can make it possible for you to time study jobs in your crating room, too, and to install the same profit making incentives there.

There is a secret to shipping room success, and it's a secret more and more cost-conscious manufacturers are discovering every day: mass production speed and economy are easy for the shipping room equipped with Delta tilting arbor and Delta radial saws. Consider what Crompton and Knowles and Barkow are doing—then write your own success story by adapting their methods to your plant.

The Delta radial saw is available in 8", 10", 12-14" and 16" sizes in ½ to 7½ horsepower. Delta tilting arbor saw is available in 8", 10" and 12" models.

Write for full details or see your Delta dealer. He's listed in your classified telephone directory under "Tools" or "Machinery."

HOW BARKOW MANUFACTURING CO. DOES IT

Barkow Manufacturing Company, Milwaukee, crating and boxing specialists, use Delta tilting arbor and Delta radial saws working together as a team. In making heavy crates, Barkow uses the Delta radial saw for cross-cutting the material before it is passed to the Delta tilting arbor saw for ripping to size. Real mass production economies are effected—so much so that Barkow now does a thriving business producing crating for other manufacturers.

DELTA QUALITY POWER TOOLS

Another Product of **Rockwell**

Delta Power Tool Division
ROCKWELL Manufacturing Company
628D N. Lexington Avenue, Pittsburgh 8, Pa.

Please send me complete information on Delta tilting arbor saws and Delta radial saws.

Signed _____ Title _____

Company _____

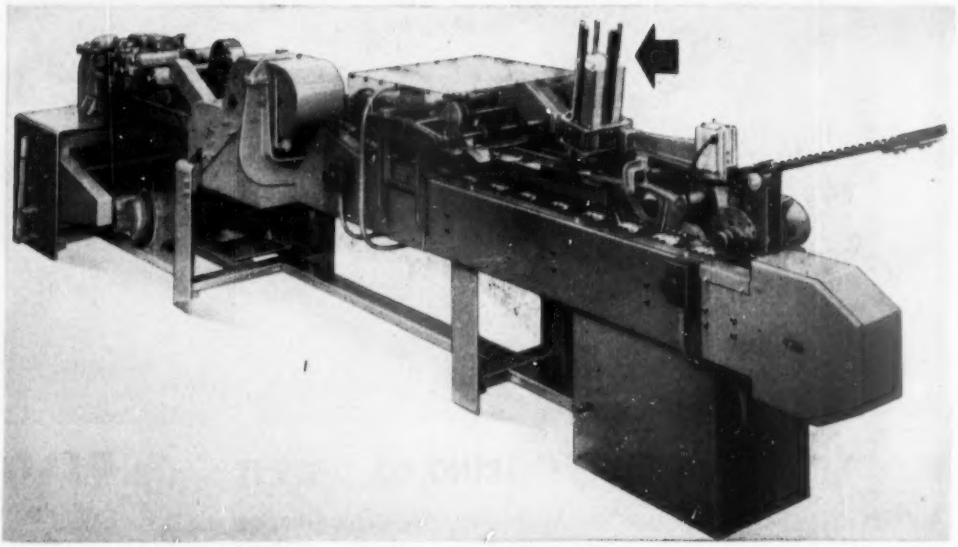
Street _____

City _____ Zone _____ State _____

Save by using available packaging machinery . . . . .

PACKAGE AS EFFICIENTLY AS YOU PRODUCE

Modern Standard-Knapp machines are packaging products ranging from cakes of soap to electric ranges. This is versatile equipment. It extends production line efficiencies to shipping platform. Reduces packaging costs in same proportion as modernized production methods reduce manufacturing costs.

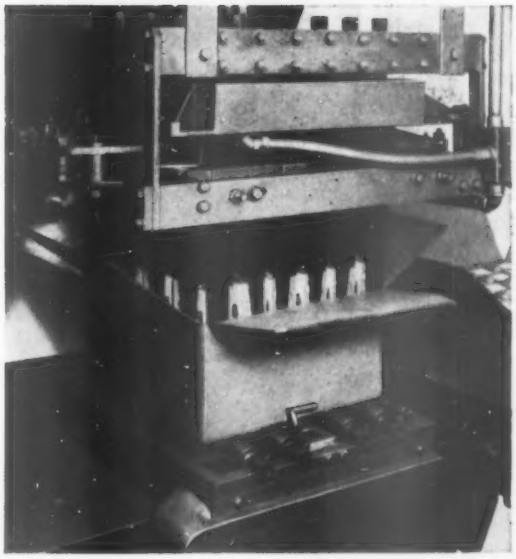


This Standard-Knapp machine automatically sets up cardboard carton, inserts rolls of film and then closes flaps of carton. Infeed chute at right accepts rolls of film, which are placed automatically three at a time in pockets. Arrow points to magazine holding flat cartons.

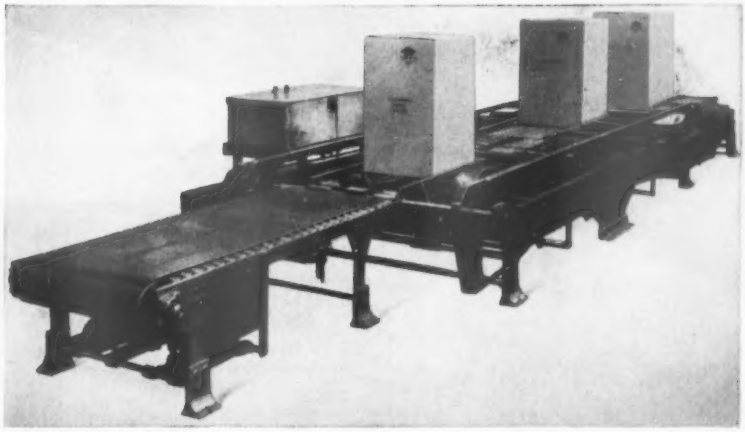
PRODUCT INTO CARTON AUTOMATICALLY

Reducing packaging costs for smaller products can start with automatic cartoning. The capabilities of this type equipment are demonstrated in the machine designed for packaging rolls of photographic film. The rolls of film are delivered to the infeed mechanism of the machine, which places them into pockets and then inserts them into individual cartons. The machine also sets up the carton, times its delivery to the insertion point, and then closes the flaps after the film is put in.

Bottle-filled cartons are smoothly packed into partitioned corrugated cases, which are automatically fed, loaded and discharged.



In this installation, corrugated cases with top flaps glued and sealed are placed over television sets on final assembly conveyor. Bottom flaps are then glued and sealed on automatic Standard-Knapp equipment, which is adjustable to varying case sizes.



CARTON INTO SHIPPING CASE AUTOMATICALLY

Automatic handling can be started or continued on Standard-Knapp Packers. These machines accept bottle-filled cartons in a single file, arrange them into lanes, group them into the desired load pattern and then load them into partitioned corrugated shipping cases. Case feed can be automatic, or it can be accomplished manually.

This same basic type of machine will also automatically pack bottles, cans and jars into corrugated cases. Other packers by Standard-Knapp will mechanically load 5- and 10-lb. bags or packages into bales.

SHIPPING CASE READIED FOR SHIPPING

Another point at which automatic operation can be started or continued is in the preparation of corrugated cases for shipment. The most economical method by far is direct application of glue to the case flaps, followed by secure sealing. No extra package fastening materials are required — the case is the complete package. Proof of the economy of this method — and its efficiency, too — is found in the use of Standard-Knapp Gluers and Sealers for such large items as television sets and electric ranges.

These units glue, fold and then seal the case flaps in a squared pattern until they are firmly and finally set. Code marking, printing or stamping of the cases can be simultaneous with the sealing operation.

Standard-Knapp also makes machines for gluing and sealing heavy paper bales.

BENEFITS

Standard-Knapp packaging machines are designed to:

- Assure *packaging rates* at increased speeds for present and future needs.
- Maintain *quality* of package in neatness, strength and protection of product.
- Provide *economies* in packaging operations in all items of cost, including materials, labor and maintenance

HOW TO GET STARTED

Standard-Knapp packaging experts will be happy to study your requirements. They are as near as your telephone in the following cities:

Atlanta **Boston** **Chicago** **Cleveland** **Houston** **Los Angeles** **St. Louis** **New York City** **San Francisco** **Seattle**

FOR THE COMPLETE S-K STORY

write for catalogs describing machines for your industry to Dept. M. Standard-Knapp, Division of Emhart Mfg. Co., Portland, Conn.

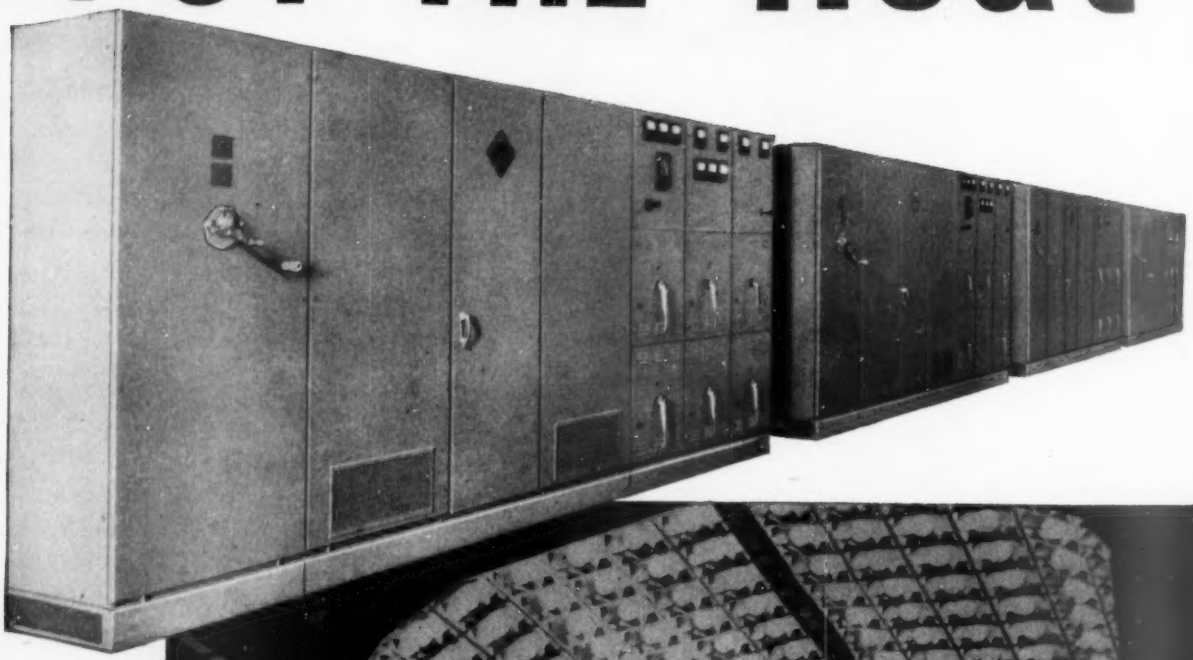
Only the best is good enough

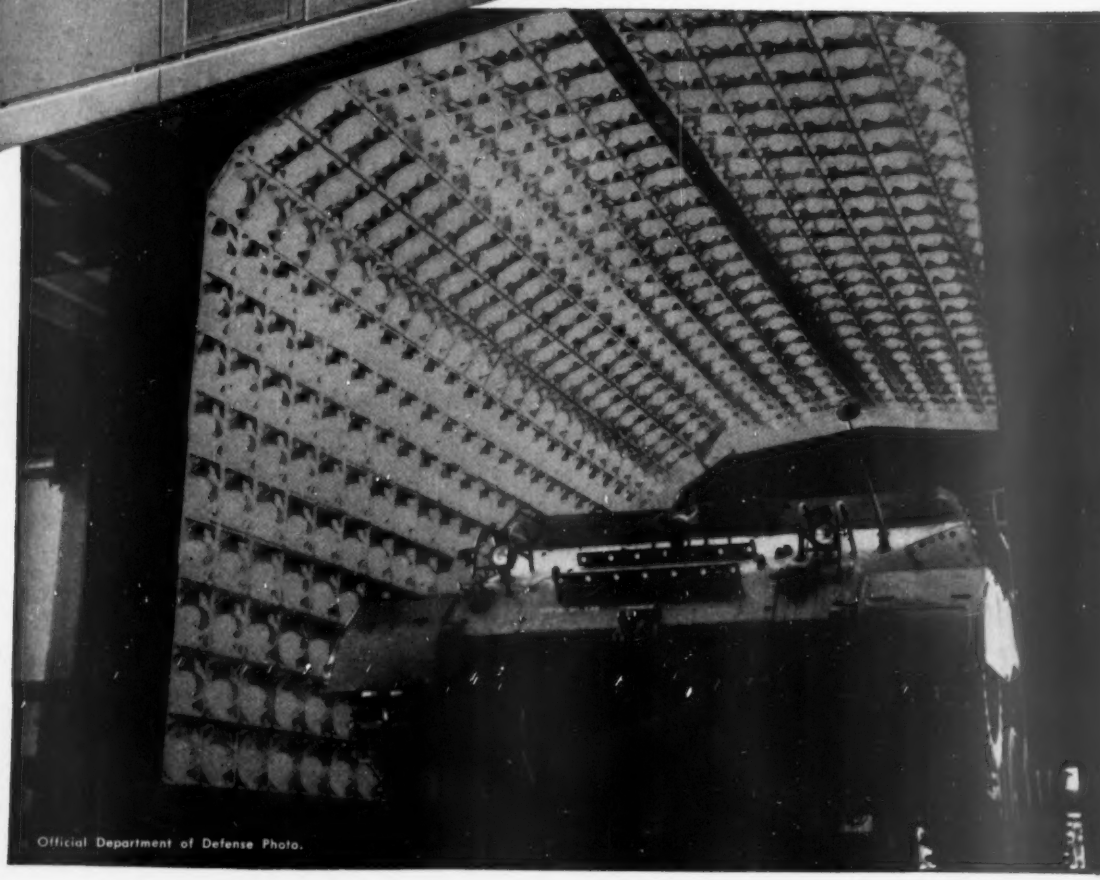
STANDARD-KNAPP

DIVISION OF EMHART MFG. CO.

PORTLAND, CONNECTICUT

ALLIS-CHALMERS PUT THE "Heat"





Official Department of Defense Photo.

UNIT SUBSTATIONS

ON PRODUCTION!

YOU CAN INCREASE the production of your plant without adding production equipment or hiring more help . . . just eliminate undervoltage. Motors, lights, heating units—all electrical equipment gives top performance only when operated at full voltage.

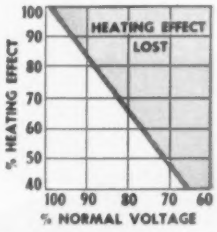
Paint baking or drying operations take longer when voltage drops. For example, a 10% drop reduces heating effect of infra-red lamps 19% . . . slows production. One paint drying operation required 63% more time when voltage dropped 10%.

A major cause of undervoltage is long, heavily loaded 480 volt feeders. Install Allis-Chalmers LCS Unit Substations at load centers and eliminate excessive line drop by shortening low voltage cables. Performance of all electrical equipment will improve . . . and personnel efficiency will increase because of better illumination from existing lighting fixtures.

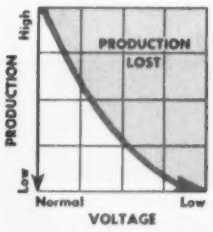
You can count on the cooperation of experienced Allis-Chalmers substation engineers in working out your distribution system. Allis-Chalmers LCS Load Center Unit Substations are neat, compact, easy to install and provide protection to personnel. Get in touch with your A-C representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3372

LCS
Unit Substations

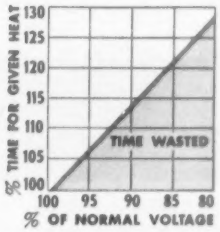
HOW UNDERVOLTAGE WASTES MANHOURS . . . CUTS PRODUCTION



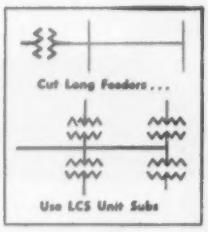
FULL OUTPUT from existing equipment demands full voltage. Heat output of infra-red lamps (used for baking paint on metal, drying coils of electrical apparatus and similar applications) drops with undervoltage. Output of resistance furnaces also drops off as the square of undervoltage.



PRODUCTION LOSSES RESULT from undervoltage. In one case a 10% drop in voltage cut the output of an infra-red drying oven from 1500 pounds per hour to 1275. Undervoltage means less work done each day . . . greater overhead for the work done, more manhours to be figured into every job.



TIME IS WASTED when undervoltage is distributed to infra-red bulbs and other heating devices. It takes longer to deliver the same amount of heat . . . longer to do a given job. In one plant, drying time for black painted sheet steel increased from 11 to 18 minutes by a 10% drop in voltage.



A MAJOR CAUSE OF UNDERVOLTAGE is voltage drop in secondary feeders. Long low voltage lines may prove inadequate as production schedules are stepped-up and new machines added. Install substations at load centers to cut feeder length, reduce voltage drop and increase production.

ALLIS-CHALMERS

A-C ALLIS CHALMERS

See the largest and most comprehensive array of materials handling equipment ever assembled in one place and at one time! More than 250 companies will present and demonstrate six acres of machines, supplies and services that are today's pacemakers for cost reduction and operating efficiency.

Top experts will examine new developments in materials handling techniques at conference sessions concurrent with the show.

For information, address
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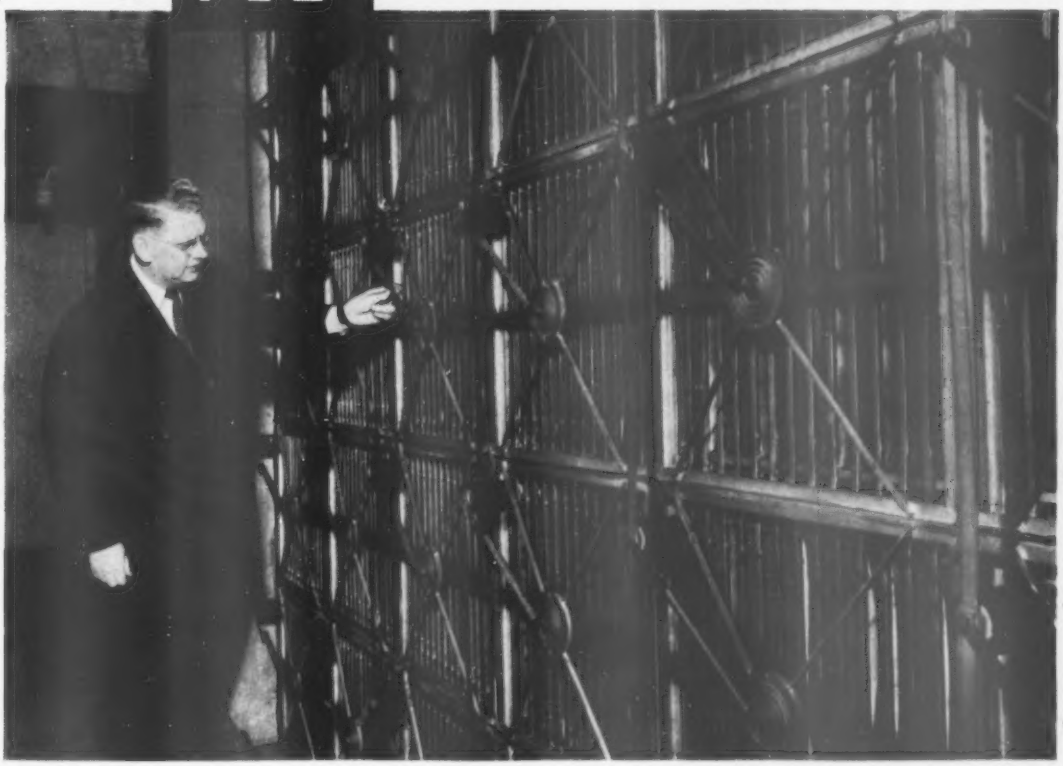
only AAF makes the complete line



AAF's ELECTRO-PL—an exclusive development of AAF engineering research, and the world's only dry-type electronic air filter! It offers these important advantages • Low initial cost • Easy installation • Simple economical maintenance • Safety in operation • Efficient air filtration even when there are power failures.

In the above photograph we show part of the ELECTRO-PL installation which provides a constant clean air volume of 95,000 cfm for the Bell Savings and Loan Association Building in Chicago, Illinois. Architects and Engineers: JOHNSON AND JOHNSON; *Mechanical Contractors:* ACORD VENTILATING COMPANY.

ELECTRO-MATIC

* ELECTRO-CELL

* ELECTRO-PL

ELECTRO-MIST

* ELECTRO-KLEAN

* AUTO-AIRMAT

* AIRMAT PL-24

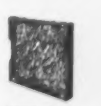
* DEEP-PAK

* DEEP BED

M/W & HV UNITS

* DRIFILTER

MULTI-DUTY


RENU-GLAS

AMER-GLAS

Why does AAF make 8 dry-type* air filters?

The answer is simple, but *important* to all Engineers and Executives responsible for air cleaning applications. These eight different dry-type air filters were specially designed to meet the complex combination of factors facing the engineer in solving dust and air contamination problems.

AAF's eight types of dry filters offer the engineer maximum flexibility in combining the following factors to fit specific job requirements:

- Cleaning Efficiency
- Maintenance Methods
- Space Requirements
- Sizes and Air Volumes
- Practical and Realistic Range of Costs

Our nation-wide Sales and Engineering staff is at your disposal. Please write or wire . . . . no obligation of course. Fully descriptive literature on all of these AAF filters is available on request.

American Air Filter
COMPANY, INC.
361 Central Avenue, Louisville 8, Ky.
American Air Filter of Canada, Ltd., Montreal, P. Q.

Introducing...

A NEW LINE OF AIR CIRCUIT BREAKERS

THREE NEW BREAKERS have been added to the line of General Electric Type AK breakers. This means that the AK line can be secured in interrupting ratings from 15,000 to 100,000 amperes.

SELECTIVE OPERATION up to full interrupting rating is now provided by triple-characteristic tripping devices which open the breaker to isolate a fault.

STORED-ENERGY CLOSING MECHANISM in new breakers gives safer, positive closing even against fault conditions. Closing is accomplished by energy stored in a sturdy closing spring even if control power is lost.

MULTIPLE CONTACTS give faster arc extinction, longer contact life and reduced maintenance.

INTERCHANGEABLE PARTS between breakers greatly reduce parts stocking problems. The main physical difference between breakers is the number of contact fingers which increases with rating.

COMPLETE NEW LINE OF DRAWOUT EQUIPMENT having whatever circuit pattern required, can be manufactured for shorter shipments by using standard circuit breaker compartments.

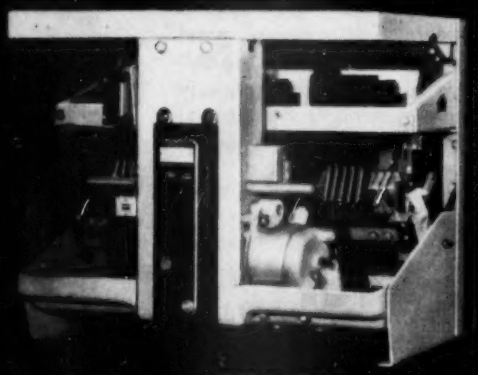
READILY ACCESSIBLE CURRENT TRANSFORMERS can be changed without disturbing bus connections.

INTEGRAL RACKING MECHANISM on removable unit cuts maintenance expenses.

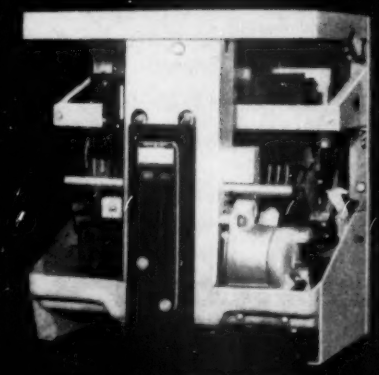
For full information, ask your local G-E sales representative for Bulletins GEA-5915 and GEA-5916 or write to General Electric Company, Schenectady 5, N. Y. 873-1

GENERAL ELECTRIC

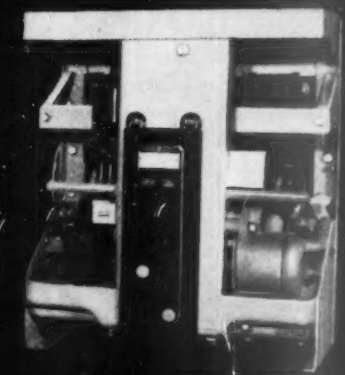
600 volts A-C 250 volts D-C



New Type **AK-1-100**
Rated: 4000 amps
100,000 amps interrupting



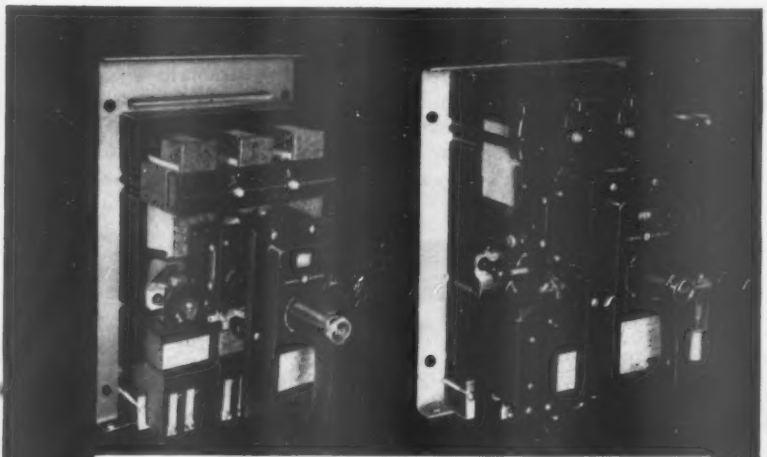
New Type **AK-1-75**
Rated: 3000 amps
75,000 amps interrupting



New Type **AK-1-50**
Rated: 1600 amps
50,000 amps interrupting

1878 75 1953
YEARS OF ELECTRICAL PROGRESS

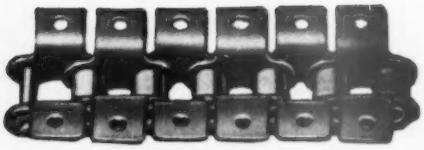
NOW, FOR THE FIRST TIME 30-cycle momentary ratings equal to full interrupting ratings permit selective operation under all conditions.

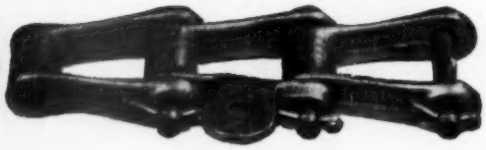
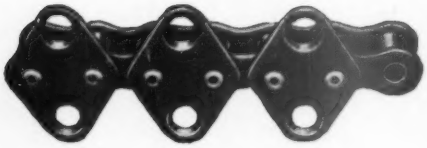


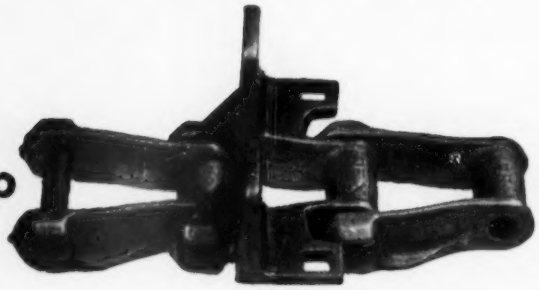
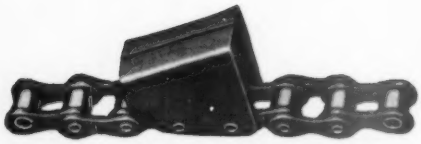
AK-1-25 and AK-1-15 Breakers, introduced in 1948, complete the line with ratings of 600 and 225 amps, interrupting ratings of 25,000 and 15,000 amps.

New line of drawout enclosures, designed for AK breakers. Now, for the first time, a line of breakers specifically designed for drawout equipments.

HELP

help ...help 

help  ...help 

help  ...help 

Here's plenty of "HELP" for you if your handling problem involves the movement of material to, through, and away from a machine. CHAIN and ATTACHMENTS are the biggest "HELP" you can find.

In the complete CHAIN BELT COMPANY line of more than 2000 sizes and types of chain . . . *and every type has a number of attachments* . . . you'll find exactly what you need for most efficient product movement . . . lowest overall operating costs. And, because the line *is* complete, you can choose the chain that will reduce costs—improve performance—insure trouble-free operation.

If exact, split-second timing is your problem, Baldwin-Rex® precision finished roller chain is your answer. If low initial cost is important, Rex® Cast Chain will meet this requirement. If heavy loads at slower speeds are your problem, a Rex Chabelco®

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KANSAS CITY • LOS ANGELES • LOUISVILLE

Distributors in all principal cities

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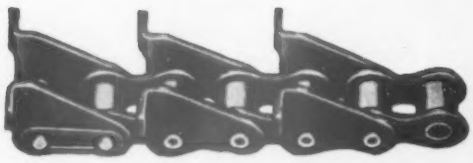

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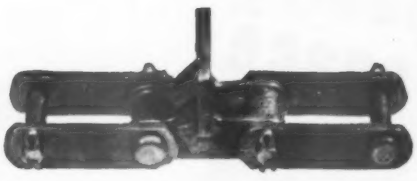

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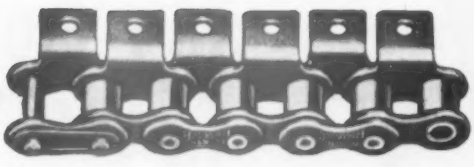

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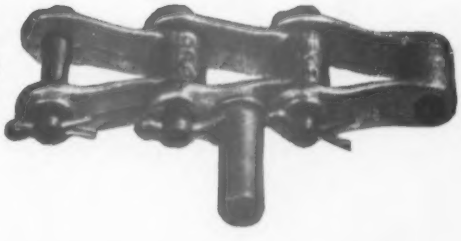

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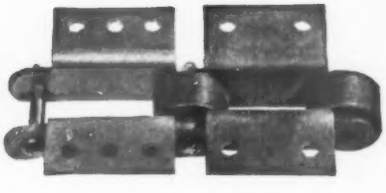

...help

...help

Steel Chain is the ideal solution. These and the many other types of chains can all be furnished with a wide range of attachments.

To be sure of obtaining the *exact* chain and attachment that will be *exactly* right for your needs, why not have your Chain Belt Field Sales Engineer help you? His specialized knowledge can prove extremely valuable to you in planning for lower cost, improved performance from the equipment in your plant. Or for helpful information, mail the coupon below.

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Gentlemen:
Please send me a copy of Bulletin 50-35 on "Chains and Attachments for Low-Cost Conveying."

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Company.....*Dept*.....

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★ 20% more capacity in the same space

★ Lowest cost per A.H. to own and operate

Heavier demands on all types of battery-powered haulage equipment dictate the need for batteries with greater capacity.

The new Exide-Ironclad T-H battery gives 20% more capacity in the same space—WITHOUT SACRIFICE OF LONG LIFE for which Exide-Ironclad Batteries are famous.

This new T-H battery is of the time-tested Exide-Ironclad construction, employing the exclusive slotted tube positive plate. New materials have made structural changes possible, which permit the use of larger positive plates—resulting in increased capacity.

The T-H line of Exide-Ironclad Batteries includes capacities for all battery-powered haulage units.

Now-more than ever before... YOUR BEST POWER BUY AT ANY PRICE!

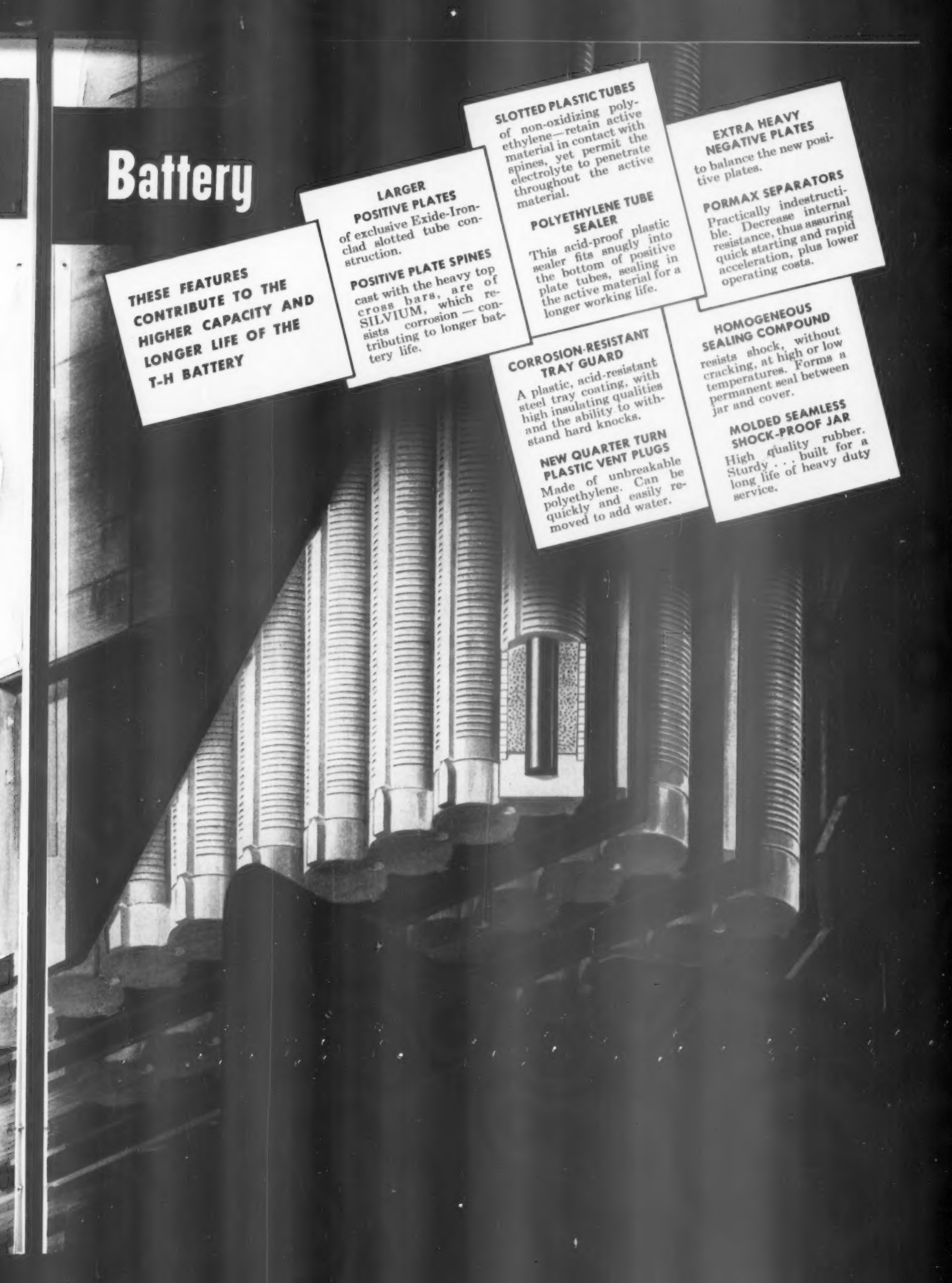
Thrifty Hauler

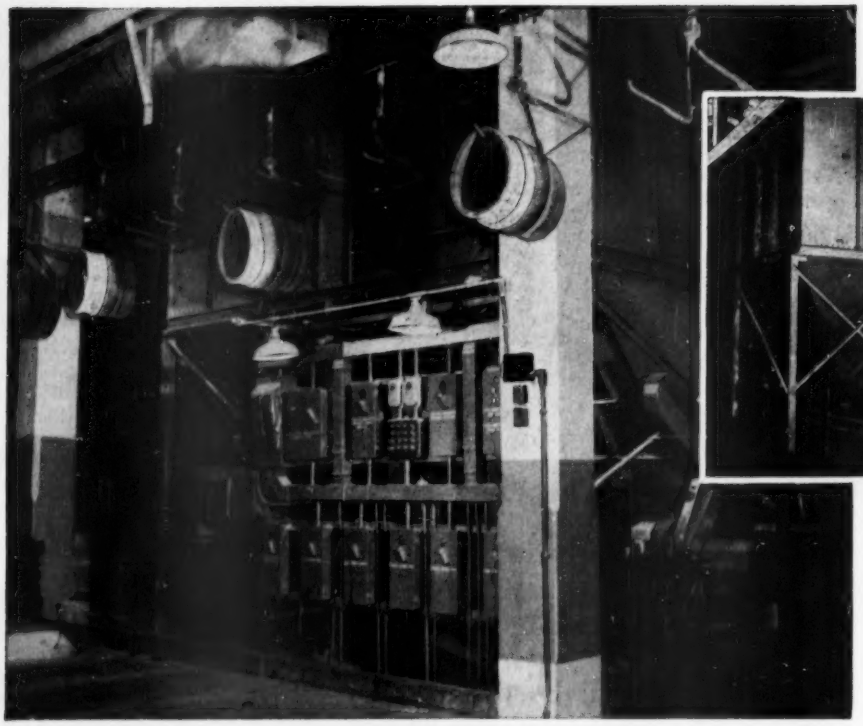
THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 2

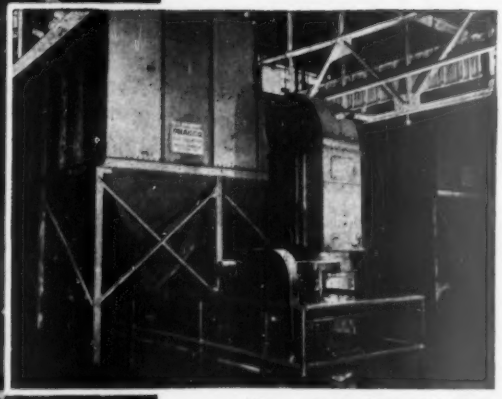
Exide Batteries of Canada, Limited, Toronto

1888—DEPENDABLE BATTERIES FOR 65 YEARS—1953

"EXIDE", "EXIDE-IRONCLAD", "SILVIUM", "PORMAX", *Reg. T.M. U.S. Pat. Off.*


Battery
THESE FEATURES CONTRIBUTE TO THE HIGHER CAPACITY AND LONGER LIFE OF THE T-H BATTERY
LARGER POSITIVE PLATES
of exclusive Exide-Ironclad slotted tube construction.
POSITIVE PLATE SPINES
cast with the heavy top cross bars, are of SILVIUM, which resists corrosion — contributing to longer battery life.
SLOTTED PLASTIC TUBES
of non-oxidizing polyethylene—retain active material in contact with spines, yet permit the electrolyte to penetrate throughout the active material.
POLYETHYLENE TUBE SEALER
This acid-proof plastic sealer fits snugly into the bottom of positive plate tubes, sealing in the active material for a longer working life.
EXTRA HEAVY NEGATIVE PLATES
to balance the new positive plates.
PORMAX SEPARATORS
Practically indestructible. Decrease internal resistance, thus assuring quick starting and rapid acceleration, plus lower operating costs.
CORROSION-RESISTANT TRAY GUARD
A plastic, acid-resistant steel tray coating, with high insulating qualities and the ability to withstand hard knocks.
NEW QUARTER TURN PLASTIC VENT PLUGS
Made of unbreakable polyethylene. Can be quickly and easily removed to add water.
HOMOGENEOUS SEALING COMPOUND
resists shock, without cracking, at high or low temperatures. Forms a permanent seal between jar and cover.
MOLDED SEAMLESS SHOCK-PROOF JAR
High quality rubber. Sturdy . . . built for a long life of heavy duty service.





(Above) Dracco Filters at Goodyear recover carbon black from Banbury Mixers.

(Left) Dusted tires on conveyor move past Dracco Filter which captures powder from dusting operations for re-use.

IT TOOK MORE THAN EQUIPMENT TO SOLVE GOODYEAR'S DUST PROBLEMS!

● Two special Dracco Dust Control systems were recently incorporated into existing processes at The Goodyear Tire and Rubber Co. in Akron, Ohio.

One system collects carbon black from Banbury Mixers; the other traps powder used for dusting uncured tires. In both systems Dracco's design provides for re-use of all collected materials by automatically returning them to process.

Even with superior Dracco Dust Control Equipment in these systems it took an extra something to assure highly efficient, integrated dust control. This was Dracco's *application engineering* which resulted in custom-designed installations exactly meeting Goodyear process requirements. This precise engineering was the key factor in turning Goodyear's dust problems into dust profits.

For greater industrial efficiency, control your plant dust. For greater dust control efficiency, remember Dracco—the Name, the System, the Engineering Skill.

DRACCO CORPORATION

4075 East 116th Street · Cleveland 5, Ohio

Dracco Bulletin 800 presents valuable information on "Industrial Dust Control and Recovery". Write today for your copy.

AIRSTREAM CONVEYORS · UNI-FILTERS · ELECTRIC TIMERS · WHIRL-CLONES · INDUSTRIAL FANS · FEEDERS AND LOCKS

DRACCO *Performance Proved*

Airstream **CONVEYORS · DUST CONTROL EQUIPMENT**

they willingly wear the cooler pair

HY-TEST

SAFETY SHOES

the safety shoe they want to wear

They WELCOME the cool comfort of Hy-Test Safety Shoes. Workers are eager to wear these summer favorites because Hy-Tests are cooler... cooler even than many shoes that don't have Hy-Test's protective features. They're actually ventilated, as well as having all the standard safety features, so the wearer gets protection and cool-air comfort... BOTH AT THE SAME TIME. The American workman prefers these Hy-Test Safety Shoes. He KNOWS his feet are safe and he FEELS they're many degrees COOLER.

ALL HY-TEST SAFETY SHOES FEATURE BOLTAN LEATHER INSOLES

HY-TEST ANCHOR FLANGE SAFETY SHOES

Insure Workers' Feet In Sure Protection

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THE WORLD'S LARGEST SELLING SAFETY SHOE

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NEW YORK OFFICE: SUITE 1706, 320 WEST 34TH ST.

WHAT *Life-Line* REALLY DELIVERS IS MORE SERVICE...LESS SERVICING

See how the maintenance has been engineered out with modern *Life-Lines*

Forget your previous ideas of motor and control maintenance. The advanced design of Life-Line motors and Life-Linestarters sets new lows in maintenance. Excessive maintenance has been engineered out—in advance.

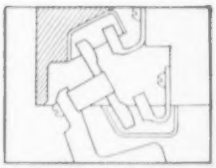
Take the Life-Linestarter for example: There are fewer moving parts. Operation is simple. No complex linkage in contact closing arrangement. No sliding surfaces. No hinge pins. Contacts, too, are protected by the exclusive deionizing principle of arc extinction—the most efficient method devised. Contact burning is minimized—contact maintenance engineered out!

And the Life-Line motor has set new standards for motor manufacturers. Pre-lubricated bearings do away with lubrication maintenance. Heavy structural steel gives new strength . . . provides more torque per pound. New stator slots and insulating material add years of maintenance-free service.

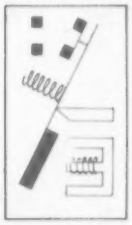
Summed up—what is really engineered and built into Life-Lines is simply—more service on the job—less servicing, and down time. Ask your Westinghouse representative to show you proof that Life-Line motors and Life-Linestarters are the equipment built to match the high productivity requirements of today's industry. A call to your local office will bring you fast service, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21696-A

YOU CAN BE **SURE**... IF IT'S

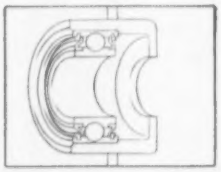
Westinghouse



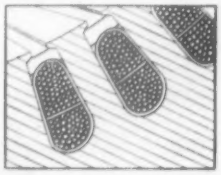
STARTER *Exclusive "De-ion®" Arc Quencher* confines, divides, extinguishes hot arcs fast!



Never Jams. No sliding surfaces to wear—no sticking—no jamming—nothing to wear or replace.



MOTOR *Needs No Lubrication.* Pre-lubricated factory-sealed bearings eliminate troubles due to over or under lubrication, dust and dirt.



Cuts Winding Burnouts. Pear-shaped slot design eliminates pockets. No corner voids remain to collect dirt, moisture.

Design Around

BOSTON GEAR CATALOG

Lists all gears and other BOSTON Products. Contains time-saving information on gear selection and useful reference data. Ask your Boston Gear Distributor . . . . or write: Boston Gear Works, 62 Hayward Street, Quincy 71, Mass.

Put this **STAMP OF APPROVAL** of 250,000 users on your product.

EQUIPPED WITH BOSTON Gears® Standardized Products

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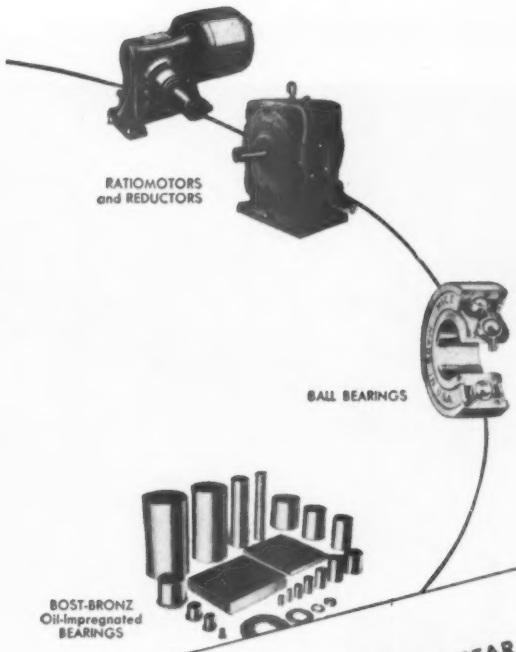
STANDARD STOCK GEARS

and other

POWER TRANSMISSION EQUIPMENT



At Authorized BOSTON GEAR DISTRIBUTORS — a

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stock of BOSTON Gears and other BOSTON Products is ready to fill your orders promptly

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Compare your gear-cutting costs with cost of precision-made, completely interchangeable BOSTON Standard Stock Gears. You'll find it pays to design around BOSTON.

***for* WIDEST SELECTION**

The BOSTON Catalog lists over 2000 types and sizes of gears . . . and a full range in the many other BOSTON Power Transmission Products.

***for* PROVED QUALITY**

There's no "gamble" when you add BOSTON to your purchasing specifications. BOSTON quality has remained the industry's standard for 75 years. That's why BOSTON products are first choice of more than 250,000 cost-wise industrial buyers.

***for* NEARBY STOCKS**

These BOSTON Products are available from 80 of the nation's top-rated, most experienced Industrial Distributors. When it's BOSTON equipped, the machine you make is only minutes away from a reliable source of repair parts.

GET THE "BEST BUY" . . . GET IT FASTER

Let **BOSTON** *be your "buy-word"*

"PC Glass Blocks give us the necessary to the ideal

says **ALGOT J. E. LARSON**

President and General Manager
Art Metal Construction Company
Jamestown, New York

● The Art Metal Construction Company's new office building reflects the viewpoint about functional office building design of the world's largest manufacturer of steel office furniture. As leading advocates of the value of lighter finishes for desk tops and other furniture surfaces in offices, they know firsthand the important bearing that a proper visual environment has on employee comfort and morale and how this can greatly improve office efficiency and production.

To quote Mr. Larson further: "It was our very consciousness of a good visual environment in offices that led us to use PC Soft-Lite* Prism B-55 Glass Blocks in our new office building.

PITTSBURGH CORNING CORPORATION

visual comfort office,"

The Pittsburgh Corning Light-Directing Glass Blocks have created a natural indirect lighting system in our offices. They get an abundance of glare-free daylight back into the work areas where it is needed most, and we are proud to say that our light colored office equipment and walls, ceilings and floors help make the most of the daylight your glass blocks have made available."

You can get the same results when you install PC Glass Blocks in new buildings, or use them to replace old, worn-out sash. And PC Glass Blocks have actual money saving features. There's no wood or metal sash needing periodic puttying, painting or caulking. They save on maintenance — no small, individual panes to clean. They save on heating and air-conditioning expense, because PC Glass Blocks have more than twice the insulating value of ordinary windows.

But this is only part of the story. For complete information, why not fill in and return the coupon? There's no obligation.

*T.M. Reg. Applied for

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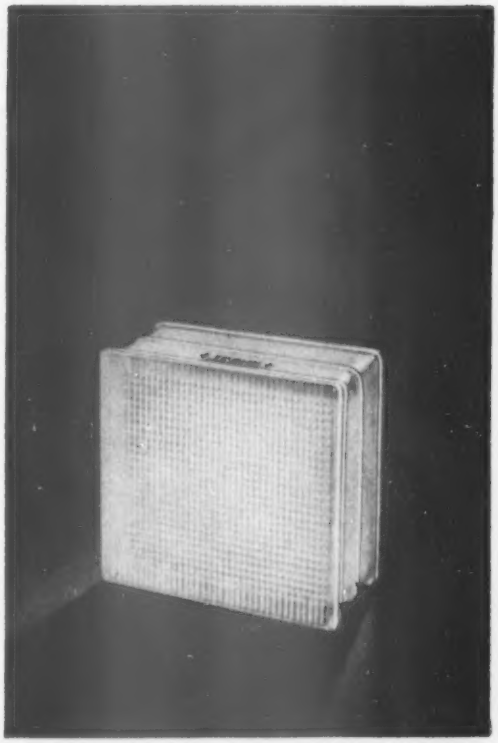

Architects: Freeburg and Lindquist, Jamestown, N. Y.;
General Contractor: Warren Construction Company, Jamestown, N. Y.

Only PC Glass Blocks give all these advantages!

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Please send me a FREE copy of "PC Glass Blocks—The Mark of a Modern Building."

☐ Send engineer to discuss specific problem.

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MOBILIFT "stand-ups" Stand Out!

MOBILIFT *Stand-Up* type Fork Lift Trucks *Stand Out* for efficient, low cost materials handling in warehouses, terminals and plants because they get more work done faster.

Here's Why:

1 The operator gets on and off an ample size platform in a second or two. He works standing up — has maximum all around visibility.

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4 MOBILIFT air-cooled 3-cylinder engine delivers abundant, reliable power. It's compact, precision-balanced and accessible for economical operation with minimum repair and service.

Let a MOBILIFT Sales Engineer show you why MOBILIFT Stand-Ups in your business will Stand Out!

Write or wire MOBILIFT for complete information today . . . No obligation of course.

MOBILIFT Lev-R-Matic DRIVE

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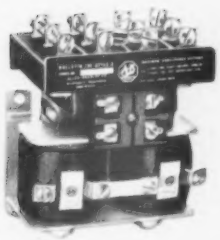
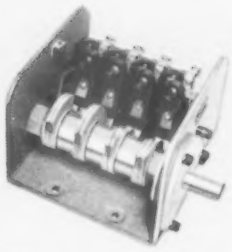
2730 San Pablo Ave., BERKELEY • 1113 Spring St. N. W., ATLANTA

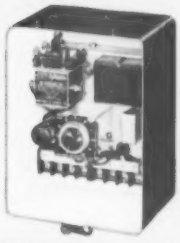


Bulletin 705 Reversing Switch for small a-c and d-c motors

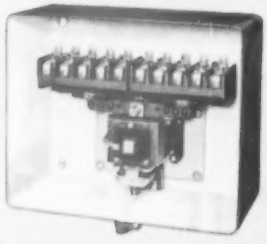


Bulletin 801 Rotating Adjustable Cam Limit Switch. Heavy duty

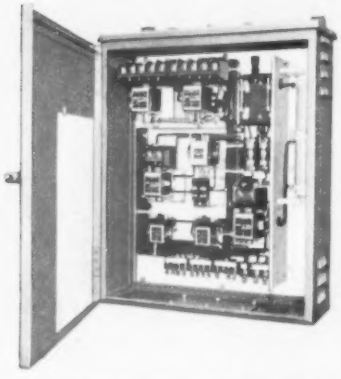
Bulletin 850 Motor Driven Timer for automatic process control



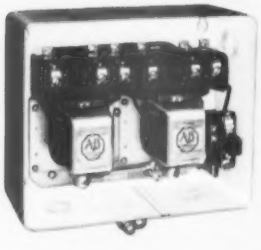
Bulletin 852 Electronic Time Delay Relay for precision timing



Bulletin 704 Nine-pole Permanent Magnet Contactor. Noiseless



Bulletin 290R D-C Reduced Voltage, Reversing Starter for marine service



Bulletin 205 Size 1 Reversing Switch for direct current motors

Bulletin 350 Drum Switch for reversing small a-c and d-c motors

Bulletin 365 Drum Controller for multispeed a-c motors

Some Useful Units in the

ALLEN-BRADLEY LINE

The standard Allen-Bradley line includes a wide range of solenoid operated across-the-line starters, combination starters, reversing switches, reduced voltage starters, and multispeed controls . . . not to mention an extensive variety of relays, contactors, and accessories.

And that is not all!

It also includes many other useful items . . . a few of which are shown here. They find application in the process industries, in marine service, in laundries, and in many other industries. All are designed for long, trouble free life and built to the widely recognized QUALITY standards that apply to the entire Allen-Bradley line.

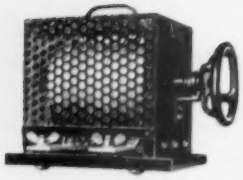
If you use motor controls . . . it will pay you to become acquainted with the latest Allen-Bradley Catalog. May we send you a copy?

Allen-Bradley Co.
1316 S. Second St. · Milwaukee 4, Wisconsin

A-B Quality

ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

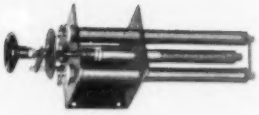
2-53-MR



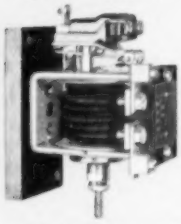
Bulletin 470 Graphite Disc Rheostat for laboratories

Bulletin 500 Knee and Foot Controllers for sewing machines

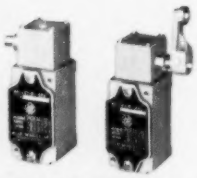
Bulletin 802 Foot Switch for heavy duty, rough service



Bulletin 410 Graphite Disc Rheostat for stepless control



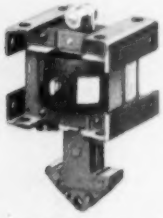
Bulletin 809 Instantaneous Current Jam-type Relay



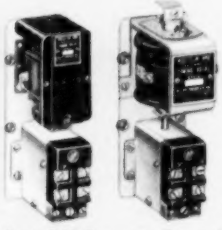
Bulletin 802 Limit Switches with various operating levers

Bulletin 600 Switch with overload breaker and pilot light

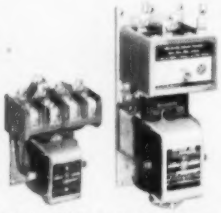
Bulletin 848 Dashpot Timing Relay. Maximum interval 30 sec.



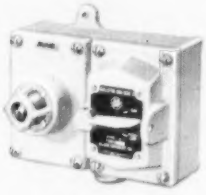
Bulletin 860 A-C Solenoid supplied in variety of ratings



Bulletin 849 Pneumatic Timers for machine tool service

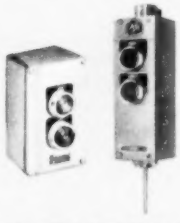


Bulletin 202 D-C Contactors for applications up to 150 amperes



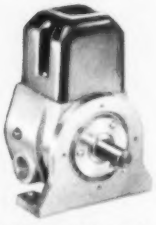
Bulletin 600 Watertight Starting Switch with pilot light

Bulletin 840 Float Switch operated by float and chain



Bulletin 800T Oiltight Push Buttons for machine tools

Bulletin 801 Rocker Arm Limit Switch for reversing service



Bulletin 808 Zero Speed Plugging Switch with magnetic lockout

Popular Accessories

in THE ALLEN-BRADLEY LINE

Above are shown a few Allen-Bradley control accessories. The variety of these units reveals the wide scope of the complete Allen-Bradley line. To machinery designers and plant engineers, the Allen-Bradley Catalog is a treasure house of standard control accessories which can be used in innumerable combinations to solve virtually any control problem. May we send you a copy of this Handy Catalog?

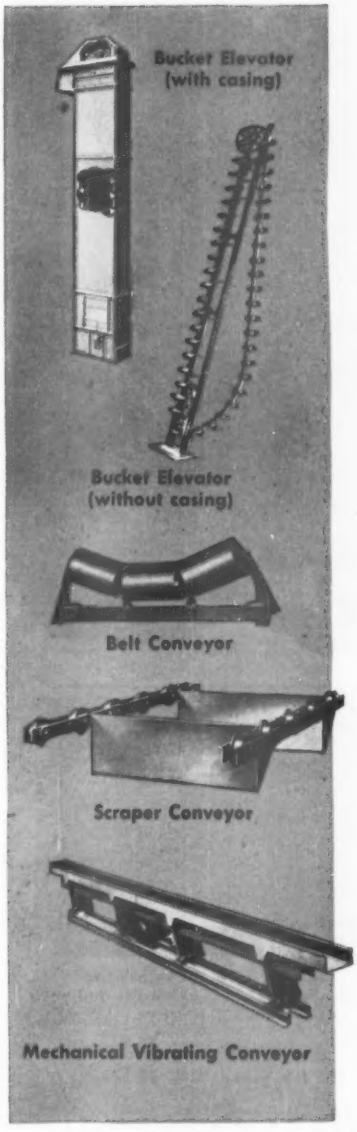
Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

Look for the A-B trademark. It is a guarantee of Quality

ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

2-53-MR

An Extensive Line Of Handling and Processing Equipment



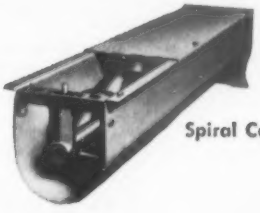
. . . here are a few units

The complete Jeffrey line is so extensive we can show only a few of the many items to help you speed production — cut costs.

Jeffrey also offers you the service of an extensive engineering department for laying out complete systems or planning the application of individual units.

Jeffrey, since 1877, has been one of the largest plants of its kind in the world — manufacturing Handling and Processing Equipment. You will profit by calling in a Jeffrey man.

Send for booklet No. 832 for a quick picture of this extensive line.



THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA.

IF IT'S MINED, PROCESSED OR MOVED

. . .IT'S A JOB FOR JEFFREY!

WHERE PLATE IS WELDED

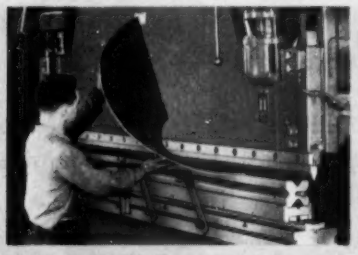
A STEELWELD IS NEEDED . . .

Whether you make boilers, furniture, railroad cars, ships, airplanes or machinery, if you work with metal from 12 gauge to one inch thick, most likely you have great need for a Steelweld Bending Press.

Steelwelds are versatile tools that perform many types of work quickly and easily, whether only one piece or a production run is required. Long, sharp welded corners can be replaced by quickly made, smooth, round, bended ones, and both appearance and strength improved. Illustrated below are some of the many kinds of work that can be performed on any Steelweld.

It will pay you to investigate the many possibilities of this modern metal-forming tool that is improving product appearance and saving time and money for many enthusiastic users.

Corrugating and any straight-line production bending can be done to hairline accuracy.



Conical sections are quickly formed with standard bending dies by use of the ram-tapering mechanism.

Large diameter holes can be punched singly. Bolt holes and other holes can be punched 25 to 150 at a time.

GET THIS BOOK!

CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

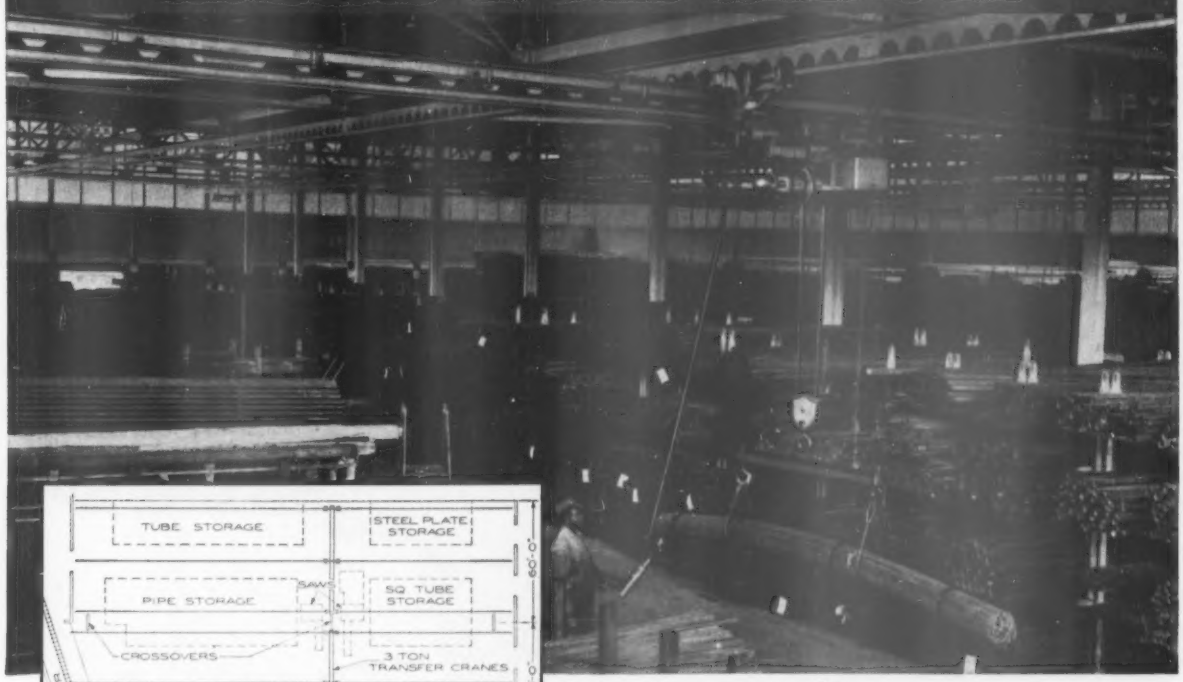
3227 EAST 281st ST., WICKLIFFE, OHIO

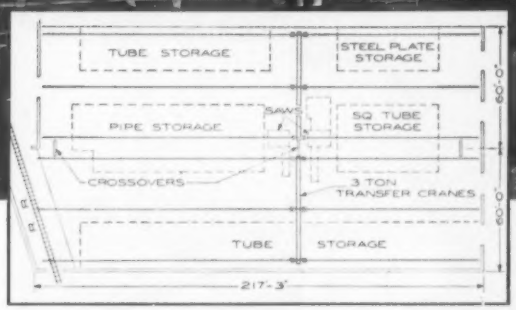
STEELWELD

BENDING PRESSES

BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING

TRAMRAIL TRANSFER CRANES *SYSTEMATIZE* HANDLING IN STEEL WAREHOUSE





The large storage area is completely covered by Tramrail crane service. Every item can be seen from the floor and readily reached with the two transfer cranes.

▲ The Tramrail transfer cranes make it easy to place the long unwieldly pipes and bar stock into storage at any height. This makes for orderliness, which is an important factor in securing high operating efficiency.

THE BIG modern warehouse of J. M. Tull Metal & Supply Co., Atlanta, Georgia, was designed to make use of overhead Tramrail equipment to enable the handling of large unit loads in and out of storage with the least effort and in the quickest time.

The principal storage section is provided with two parallel runways each having three tracks. On both runways is a 64-foot transfer crane that travels the length of the room. Cross-overs are provided, enabling a hoist carrier transferring from one crane to the other. This makes it possible to haul materials between any two points in the entire area without rehandling.

Steel is constantly on the move in this active plant. From 60,000 to 70,000 lbs. are brought in by railroad car daily and like amounts are shipped out. The material is unloaded from railroad cars at one end of the building and placed into storage. It is shipped out on trucks which are loaded at the other end.

The overhead crane system makes it possible to place incoming materials into allotted storage spaces at once. The need of storing temporarily in aisleways or other areas and extra handling which this entails is eliminated. Thus, the warehouse is kept orderly at all times and every item is readily seen and conveniently reached. Danger of handling accidents is minimized and overall efficiency is unusually high.

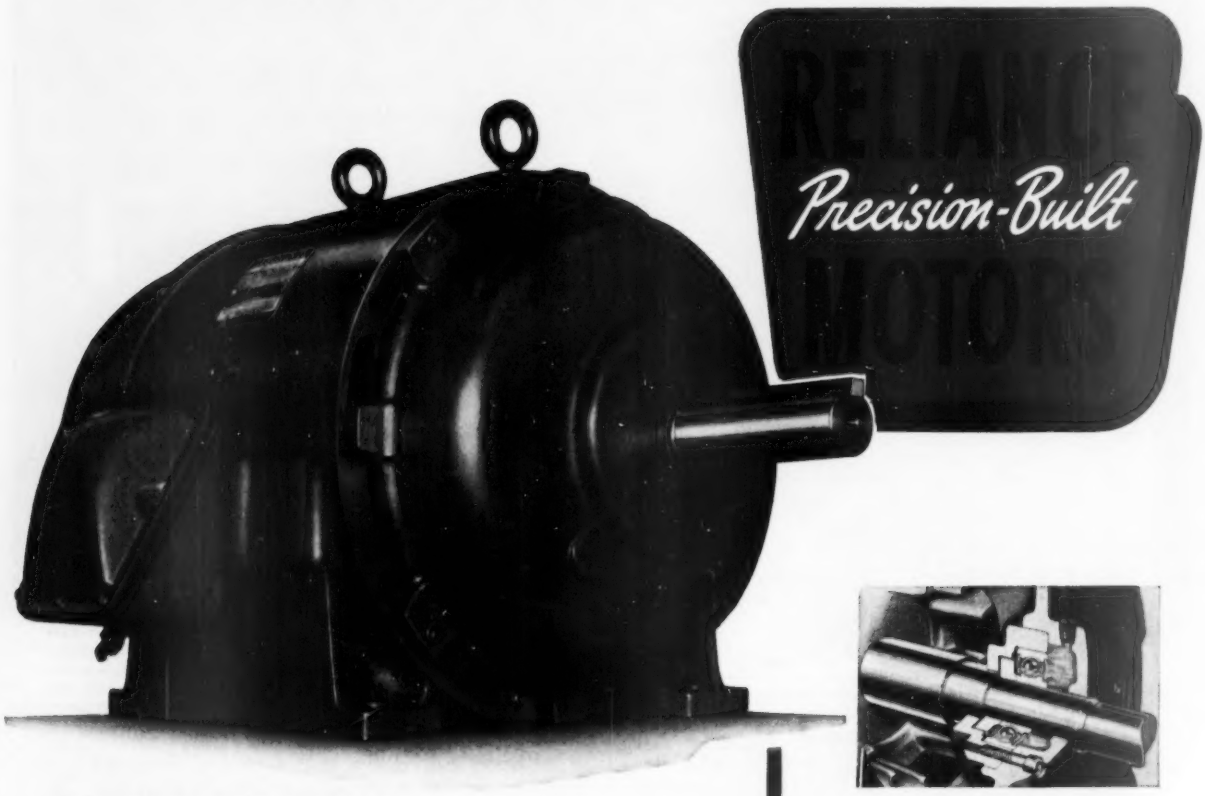
GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3281 EAST 284th St., WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

DEPENDABLE...because they're ENGINEERED FOR RUGGED SERVICE



Reliance Totally-enclosed Fan-cooled A-c. Motor. All other standard enclosures available, with wide choice of mechanical designs and special mountings. Ratings from ¾ to 300 hp.

Rugged Reliance A-c. Motors are proving that "All Motors Are NOT Alike" on grueling jobs in every industry. Heavy shafts, bearing to bearing—indestructible pressure-cast aluminum rotors—shock-resistant frame and bearing-bracket construction—man-sized conduit boxes—pressure-welded core laminations—and tough Reli-X insulation are among the many features that make these motors the most dependable, most economical that you can buy.

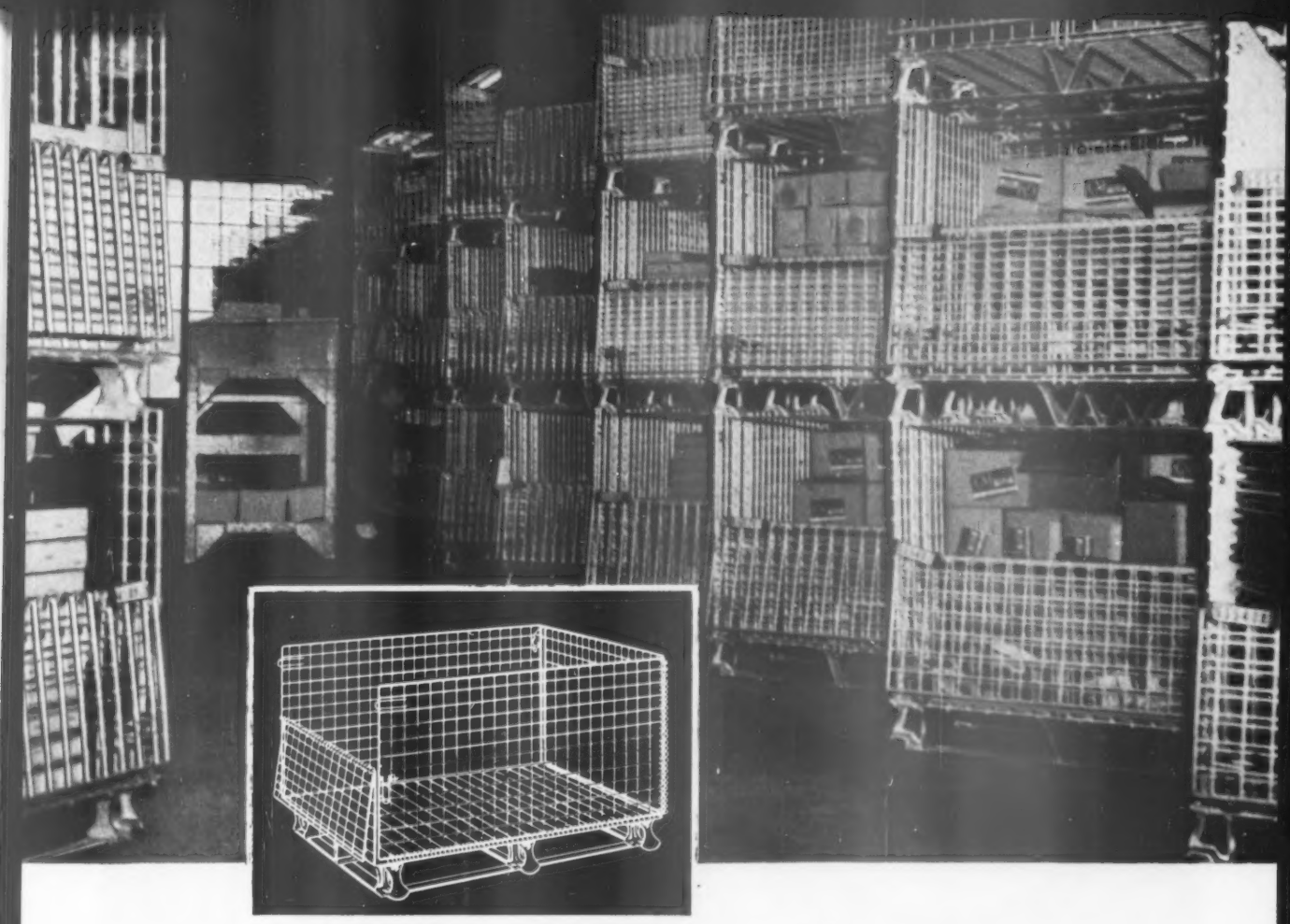
To see for yourself why these better motors will perform better on *your* job, call an Application Engineer at the Reliance Sales Office nearest you. B-1452

WHY THE RELIANCE PRE-LUBRICATED BEARING DESIGN IS BEST

The Reliance pre-lubricated bearing provides *four times more operating hours without re-lubrication* than any other bearing used in motors today. And—whatever your lubrication schedule—*you just can't grease 'em wrong!* To get the complete "inside story" on motor bearings, write today for Bulletin B-2201. It contains hard facts on the advantages of the Reliance pre-lubricated bearing design, with cutaway view, cross-section diagram, comparison chart, and statements by bearing manufacturers.

RELIANCE ELECTRIC AND ENGINEERING CO.

1070 Ivanhoe Road, Cleveland 10, Ohio • Sales Representatives in Principal Cities



How Palletainers save you money in WAREHOUSING operations

Speed is as important in warehousing as in production or shipping. Speed of placing goods in storage, making inventory, preparing orders for shipment. You must save *time* to help hold the cost line.

USP Palletainers save you *maximum* time on every one of these warehousing operations!

Placing goods in storage is a snap since items can be placed in Palletainers at the production line and trucked to warehouse without rehandling. New reinforced malleable iron legs provide 8-way entry for truck forks, assure safe, solid grip for stacking to ceiling height.

Inventory time is cut to the bone because contents of Palletainers are always visible. No stooping, no peering, no climbing of ladders. Palletainers are ideal for stampings, forgings, packaged parts, vegetables, fruit . . . *anything* that won't go through a 2" mesh!

Order make-up is a cinch. Warehouse Palletainers feature a hinged front to permit selection without unstacking! For large orders, of course, Palletainers themselves are the perfect shipping unit. Reinforced steel rod construction is virtually indestructible, eliminates all damage in transit under normal conditions. Light weight holds down freight costs; empty Palletainers fold to ¼ depth for return trips.

Get all the facts on Palletainers today. Write for full information, specifications and costs. USP materials handling engineers are at your service for obligation-free consultation. Let them show you all the ways to save time, worry and costs with USP Palletainers.

UNION STEEL PRODUCTS COMPANY

ALBION, MICHIGAN

1903 • *Our Golden Anniversary* • 1953

—E. J. (Eph) Davis, Manager of Traffic and Order Dept., with new Caterpillar DW20 Tractor

"This Cat will never be an orphan!"

"Construction men work against deadlines. If machinery can't be serviced—regardless of age—with genuine manufacturer's parts, they don't want it. It's an 'orphan'!

"This can't happen when it's Caterpillar-built.

"If the Caterpillar dealer is temporarily out of stock, he can get any part practically overnight—by Air Express! Air Express speed, closely coordinated with our Special Order department, gives all domestic Caterpillar dealers—over 375 stores—complete parts service for every model ever built. It gives them an 'inventory' of some 80,000 different parts!

" 'Down time' is cut to the minimum . . . machine life extended to the maximum . . . with the help of Air Express speed and dependability.

"That's why Caterpillar dealers frequently tell us 'Ship it Air Express'—averaging more than 18 times a day!"

Air Express gets there first—and often *saves money*, too! In many weights and distances, rates are *lowest* of all commercial air carriers!

It pays to express yourself clearly. Say Air Express! Division of Railway Express Agency.

AIR EXPRESS

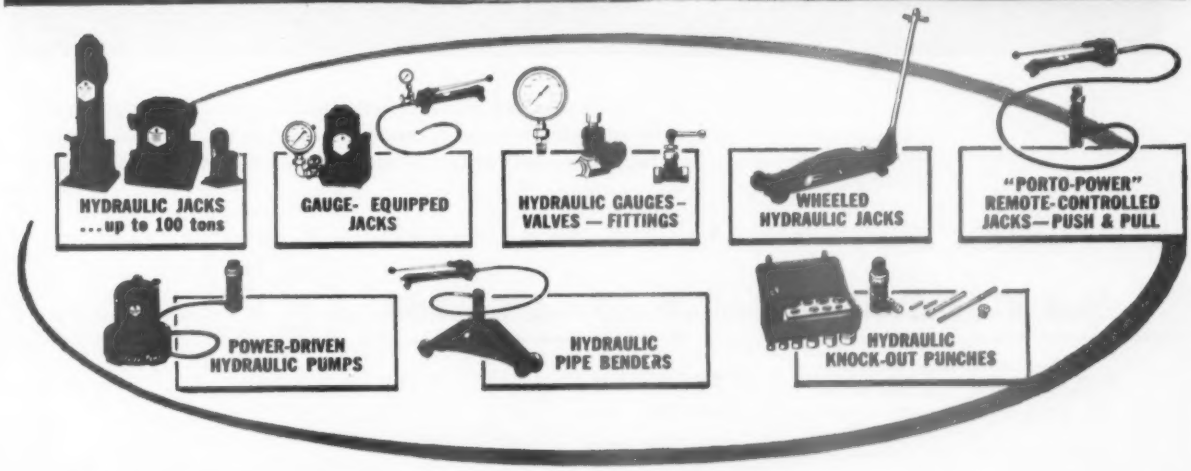
GETS THERE FIRST

via U. S. Scheduled Airlines

Pick the right jack for the job...

...from the world's most complete line of hydraulic jacks

A difficult welding problem is solved by 50-ton capacity Blackhawk Hydraulic Jacks pictured here. Two sections of a diesel engine crankshaft are held together in a fixture by six jacks. *Don't do it the hard way — do it the hydraulic way!*

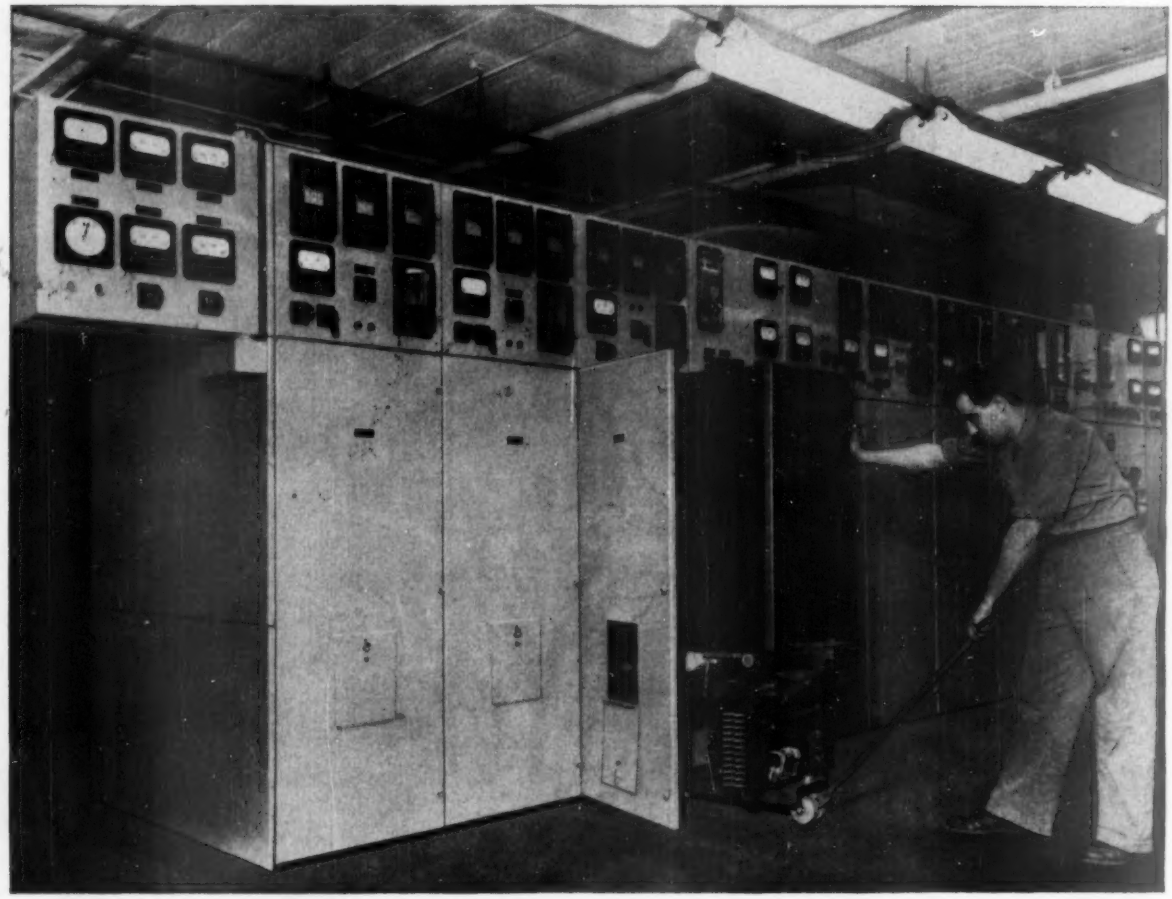


YOU GET ALL THESE HYDRAULIC TOOLS ONLY FROM BLACKHAWK

BLACKHAWK

Sold by leading distributors. Write for catalogs. Blackhawk Mfg. Co., Dept. J-2743, Milwaukee 1, Wisconsin.

I-T-E Horizontal Drawout Switchgear



I-T-E Metal-Clad Switchboards complement latest engineering advances with neat, modern design. HV circuit breakers are easily withdrawn from compartments. Safety is the keynote.

Indoor and outdoor equipment in ratings: 4160 volts—50,000, 150,000, and 250,000 KVA interrupting 600, 1200, and 2000 amperes continuous

➡ 20 years and more of easier handling

Modern switchboards last 20 years or longer. During this period, you can expect periodic inspections, load changes, certain maintenance, and, of course, short circuits and overloads.

Consider the outstanding advantages to yourself of I-T-E *horizontal drawout* switchgear over the life of the equipment in each of the following instances:

When inspections are made

Truck-mounted circuit breakers can be wheeled out of compartments quickly and easily. Safety shutters isolate "live" contacts in the compartment. Connected equipment can then be examined carefully without danger to personnel.

When loads change

Relay settings are quickly adjusted to compensate for load changes. On wider load variations, current transformers may be changed. Isolation of compartments in Metal-Clad construction permits these changes without interference with the main bus. Circuit breakers may be removed from their compartments to assure complete safety. Horizontal drawout circuit breakers in drawout switchboards make this possible and *convenient*.

When maintenance is performed

Each circuit breaker is withdrawn from switchboard, checked, and adjusted if necessary. Service continuity is assured. While the circuit breaker is out of service, a spare can be used to replace it. One spare circuit breaker provides adequate insurance for many feeder circuits.

Your local I-T-E sales engineer will be glad to show you the specific advantages of Horizontal Drawout Switchgear in your own application. Or for complete details on I-T-E Metal-Clad Switchgear, send for Bulletin 7004-B, Dept. —, I-T-E Circuit Breaker Co., 19th & Hamilton Sts., Philadelphia 30, Pa.

METAL-CLAD SWITCHGEAR

I-T-E CIRCUIT BREAKER COMPANY
19TH AND HAMILTON STREETS • PHILADELPHIA 30, PA.
R&IE Equipment Division • Greensburg, Pa.

HOW MUCH HAPPINESS

AMERICAN MUTUAL

Service from salaried representatives in 78 offices! Savings from regular substantial dividends!

CAN MONEY BUY (OODLES!)

By Mr. Friendly

MONEY . . . I'm just nuts about it,
No ifs, ands or buts about it;
Folding sunshine, good old kale,
Moola, moola, hail oh hail!

Cash and coin and bright mazuma
Puts me in the best of humah;
Lettuce, cabbage, long green too . . .
Lucre, velvet . . . I love you!

The point is this . . . if you agree
The sweetest tune is dough re mi!
If every grand seems simply grand
Here's a case you'll understand.

THE $465,912.00 CASE OF THE HEINTZ MANUFACTURING COMPANY

Company: Heintz Manufacturing Company of Philadelphia, one of the most versatile pressed steel manufacturers in the U.S.A.—makers of auto body parts, household appliance assemblies, ship's parts, porcelain finished tubs, plumbing ware, metal television cabinets, jet engine components.

Record: An American Mutual policyholder for 22 years.

Savings through lower premiums: $405,620 in the past 9 years alone.

Savings through dividends: $60,292 in 9 years.

Total savings: $465,912.

Moral: If you're interested in a service that can help reduce costly accidents and premiums to way below average . . . and help raise employee morale, write for the complete case of The Heintz Manufacturing Co., American Mutual Liability Insurance Co., Dept. F-47, 142 Berkeley St., Boston 16, Mass.

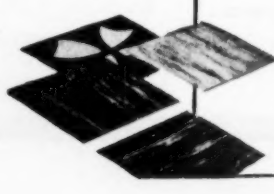
© 1953 AMERICAN MUTUAL LIABILITY INSURANCE COMPANY

Is your flooring "overhead"?

YES, in the sense that its initial cost and continued upkeep "cannot be charged to any particular part of the work or product." (Webster)

That's why flooring must be carefully chosen ...must last for years without costly repair or replacement. And because floors that look alike aren't alike, it takes an expert to help you.

The Kentile Flooring Contractor is just such an expert...fully qualified by training and experience. He knows the difference between various types of resilient flooring...how the right flooring can increase production, reduce accidents in factory areas...which floors resist grease and oils most effectively and longest—facts that will save you time, money, and work.



Call the Kentile Flooring Contractor* for up-to-date information about these floors

- ✓ *KENTILE ASPHALT TILE*
- ✓ *KENRUBBER TILE FLOORS*
- ✓ *KENFLEX VINYL TILE*
- ✓ *KENCORK FLOORS AND WALLS*
- ✓ *SPECIAL (greaseproof) KENTILE*

KENTILE INC.

***If you don't know the name of your Kentile Flooring Contractor look under FLOORS in your Classified Phone Directory or write Contract Dept., Kentile, Inc., 58 2nd Ave., Brooklyn 15, N. Y.**

NEW

You need it! Send for free copy today!

United States Rubber Company, the only electrical wire and cable producer to grow its own natural rubber and to manufacture its own plastics and synthetic rubber, makes a complete line of electrical wires and cables for every industrial and domestic application. Just published is the 1953 "U.S." Catalog, essential for men who specify, install or maintain electrical wire and cable. Send for your free copy to address below. Here are the catalog chapter headings:

1. U.S. Royal Portable Cords and Cables
2. U.S. Railroad Wires and Cables
3. U.S. Power Cables
4. U.S. Control and Signal Cables
5. U.S. Building Wires and Cables
6. U.S. Bare and Weatherproof Wires
7. U.S. Flexible Cords and Cord Sets
8. U.S. Telephone Wires and Cables
9. Miscellaneous U.S. Wires and Cables
10. Technical Data

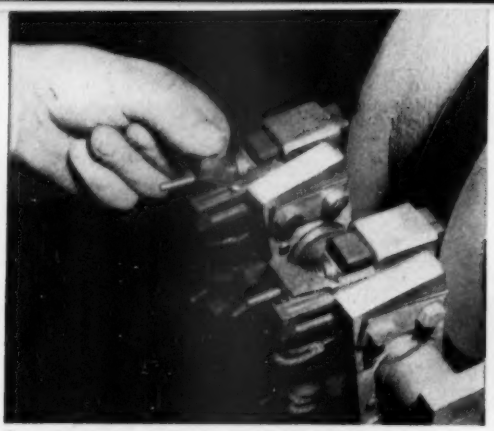
"U.S." Research perfects it...

"U.S." Production builds it

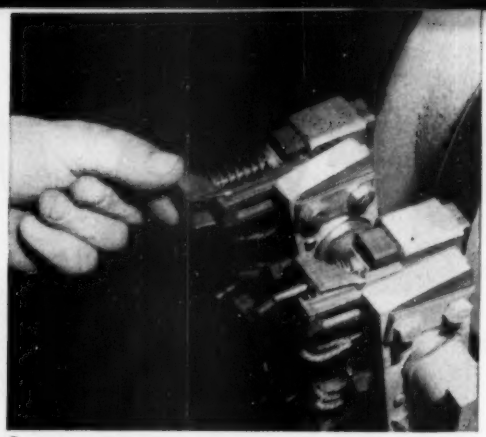
U.S. RUBBER
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

ELECTRICAL WIRE AND CABLE DEPARTMENT · Rockefeller Center, New York 20, N. Y.

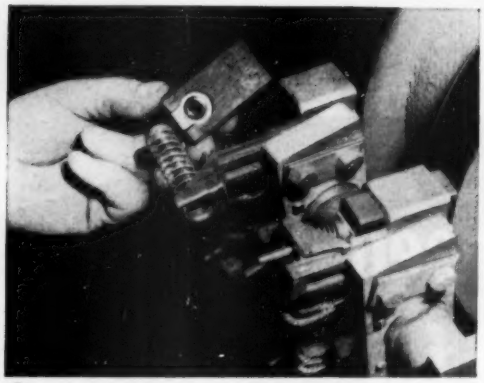


1 To reset brush tension, operator releases spring lock . . .



2 slides it back to relieve pressure . . .

3 and swings locking device to one side . . .

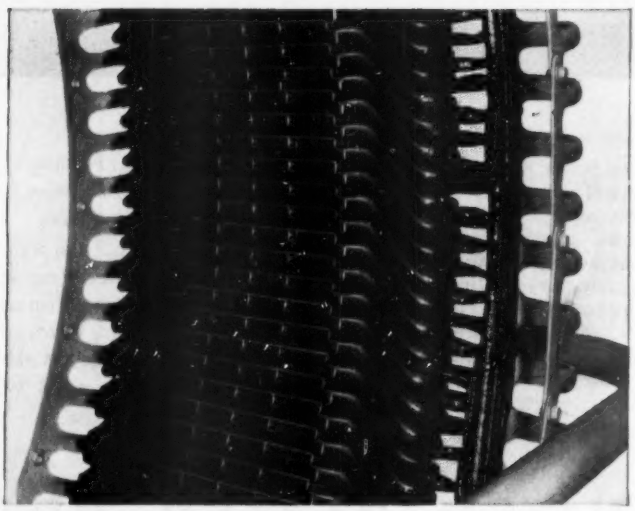


4 for fast and easy brush removal.

BRUSH-PRESSURE ADJUSTMENT, for maximum brush life, and replacement, to assure reliable motor service, are simple matters on G-E synchronous motors. A calibrated spring-loaded brush holder makes resetting brush tension or removal of brushes fast and easy. Brushes are staggered for even brush-ring wear.

See How Routine Maintenance Is

BEARING LUBRICATION can be readily checked through a large sight-level gage on the bearing pedestal; and when oil is required, handy snap-top covers are provided for easy refilling, as well as oil-ring inspection. A drain plug is conveniently located for quick oil changes.



INSULATION CLEANING is fast on G-E synchronous motors. Windings are coated with a high-gloss Glyptal* varnish that resists the accumulation of dust and can be vacuum or air cleaned in most applications. In extremely dusty or oily atmospheres, deposits can be easily wiped from the windings. Clean windings mean longer insulation and machine life.

*Reg. trademark of General Electric Co.

THIS G-E SYNCHRONOUS MOTOR, RATED 4500 HP, 300 RPM, DRIVES A RECIPROCATING GAS COMPRESSOR.

Easier on G-E Synchronous Motors!

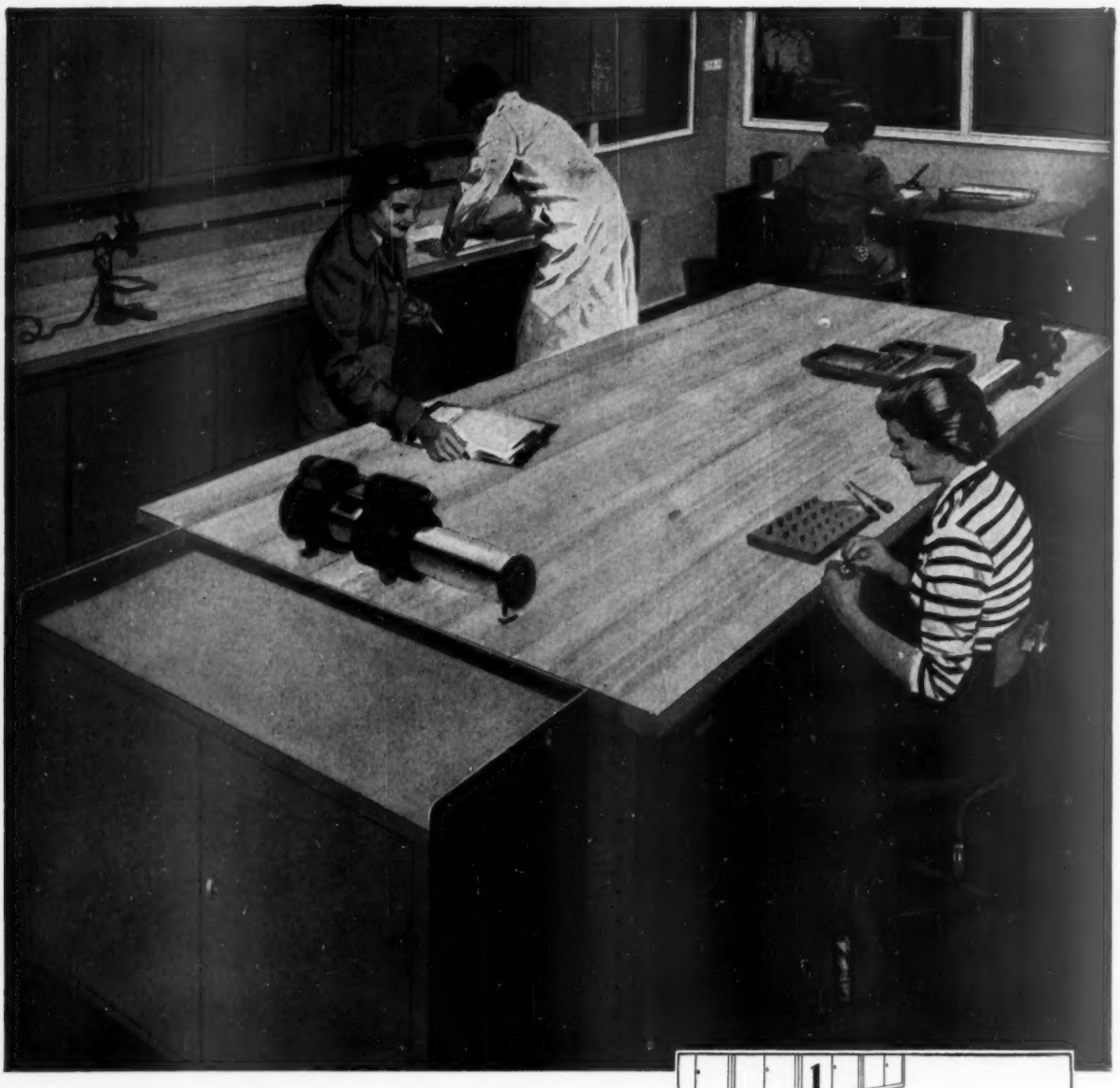
Routine maintenance involves three factors: brushes, lubrication, and insulation. To be sure that these areas are properly serviced, G-E synchronous motors have design features that make checking easy and maintenance fast. Close at hand and easy to adjust, the brush-rigging construction encourages your maintenance men to inspect regularly. Oil-level gage and inspection caps are arranged for quick checking and filling when necessary. The high-gloss insulation on G-E synchronous motor windings resists the adhesion of dust and minimizes the need for cleaning.

These features promote long, reliable motor service and save valuable time for your maintenance crews.

Before selecting your next heavy-duty motor, be sure to consider these important maintenance features. Call in your G-E representative. He will be glad to discuss the many money-saving applications for G-E synchronous motors. Meanwhile, you can obtain more information on G-E synchronous motors by requesting the following publications: GEA-5332, "Low-speed Synchronous Motors" or GEA-5426, "High-speed Synchronous Motors." Write to Section 770-28, General Electric Company, Schenectady 5, N. Y.

You can put your confidence in—

GENERAL ELECTRIC

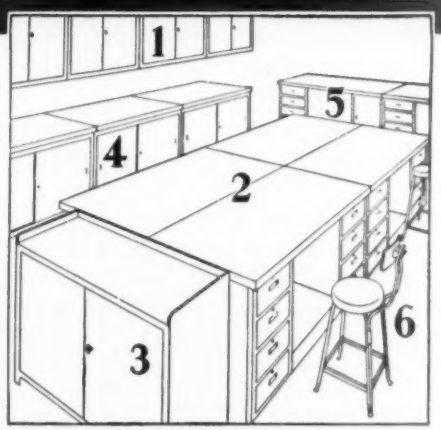


A MODERN GAGE ROOM—CUSTOM BUILT with Standard HALLOWELL Shop Equipment

Lay it out as you want it—set it up with standard HALLOWELL Shop Equipment. It's as simple as that to custom build your gage room, laboratory, toolroom or assembly line. Let us send you complete details—then order standard ready-made units from your HALLOWELL distributor. SPS, Jenkintown 11, Pa.

Our Fiftieth Year : A START FOR THE FUTURE

HALLOWELL SHOP EQUIPMENT DIVISION SPS JENKINTOWN PENNSYLVANIA



1. Wall Cabinets
2. Cabinet Benches
3. Portable Tool Cabinet
4. Cabinet Benches
5. Multiple Unit Benches
6. Stools and Chairs

BUS DUCT IS FLEXIBLE

"It's So Flexible To Plant Layout..." says The Randall Company

The Randall Company officials stated, "It's so flexible to plant layout and production line shifts that it's just what we need for future changes and expansion."

"The ease of installing your Bus Duct was amazing . . . it saved us both time and money," said the contractor, Mr. Edward P. Fogarty, President of Fogarty Electric Company, Cincinnati, about this job.

This large installation of Westinghouse Low Impedance and Plug-In Bus Duct is in the Randall Company plant at Wilmington, Ohio. It is assembled from standardized sections that allow rapid dismantling and reassembly without waste of time; duct is fully salvageable.

Up to 5,000 amperes, Westinghouse Bus Duct provides more power per pound of equipment than any system of wireway, cable or conduit. Four types are available to handle all load requirements, meet all service conditions in your plant or building from power source to outlet.

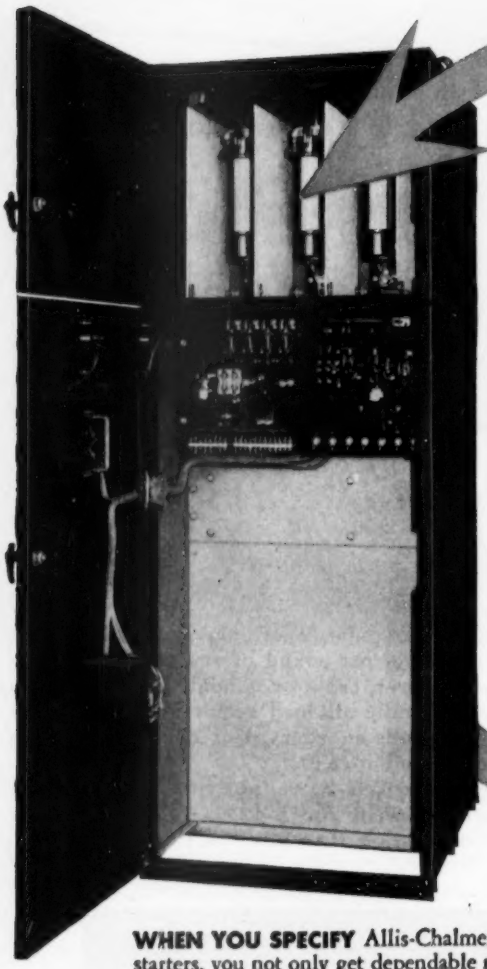
Get complete facts by calling your Westinghouse Distributor or write for B-4272-A, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-30108

DESIGN TESTED AND VERIFIED IN THE Westinghouse HIGH POWER LABORATORY

BUS DUCT

Type H Starters Give YOU Full Protection



SHORT CIRCUIT PROTECTION

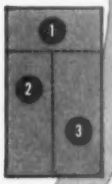
Current-limiting fuse clears short circuit in less than ½ cycle . . . long before the short has had time to harm contactor or motor. Blown fuse emits no gas, flame nor vapor, discharges no metal. Flashover caused by ionized vapor is eliminated.

OVERLOAD PROTECTION

Type 194 thermal overload relay automatically adjusts for ambient temperatures — trips only on motor overload. Prevents unnecessary motor outages. Allows use of maximum capacity, but prevents dangerous motor overloads. Can be adjusted to plus or minus 20% of rated current.

PERSONNEL PROTECTION

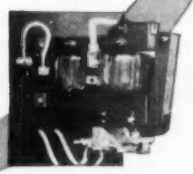
The steel cubicle is divided into three compartments for maximum personnel protection. 1 — Upper front compartment encloses disconnect type fuses. 2 — Lower front compartment houses low voltage control devices. 3 — Rear compartment contains high voltage equipment, contactors, buses, intrument transformers, etc.



Side View of Cubicle

TIME DELAY UNDERVOLTAGE PROTECTION

Should an undervoltage occur, the line contactor opens. During a predetermined period, relay remains closed to permit restarting of motors when power is restored.



WHEN YOU SPECIFY Allis-Chalmers Type H starters, you not only get dependable motor control, but you are assured of an all-important "plus"— FULL PROTECTION for man, motor and machine. Positive protection as engineered into Type H starters permits men to work in complete safety... protects motors and machines from costly damage . . . lengthens equipment life . . . increases production by reducing downtime. Get all the facts from your nearby A-C representative or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3982

ALLIS-CHALMERS

EASY

TO READ

EASY TO OPERATE

And you get long, *accurate* service with these Fairbanks-Morse built-in advantages.

Fairbanks-Morse Dial Scales speed weighing because they're designed for easiest reading. The weighmen can read the correct weight at a glance. Even with drop weights applied, weights are still read right at the point of the indicator . . . no mental calculations are required. It's easier . . . faster . . . more accurate. Human errors are eliminated.

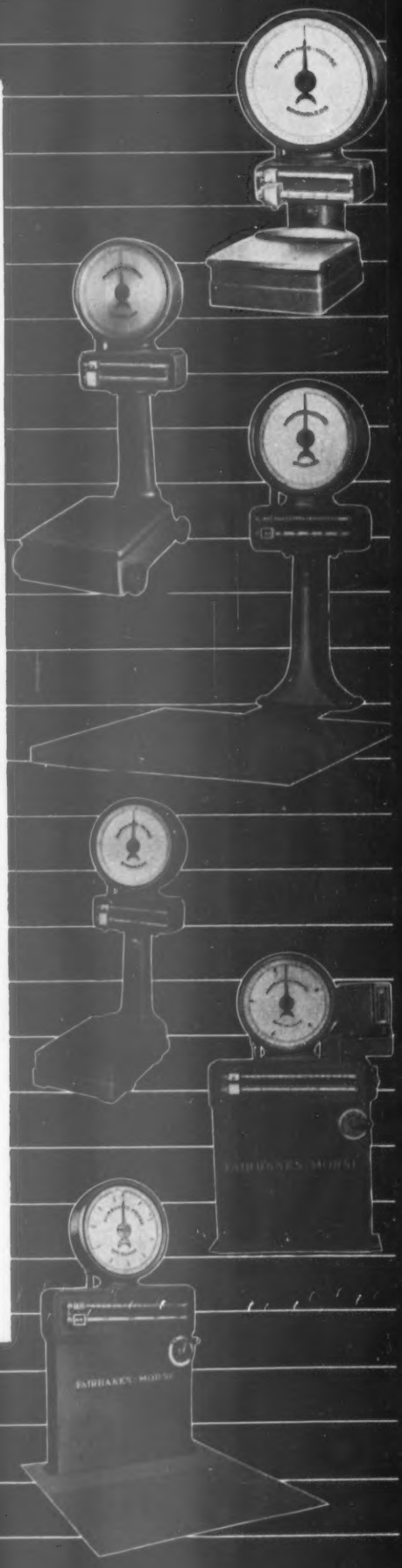
Check these features that mean fast, accurate weighing, with your Fairbanks-Morse weighing expert or write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

SCALES • DIESEL LOCOMOTIVES • ELECTRICAL MACHINERY

FAIRBANKS-MORSE

a name worth remembering when you want the best

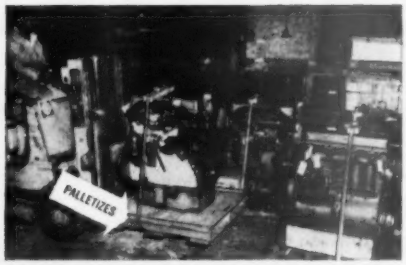
SCALES • DIESEL LOCOMOTIVES • ELECTRICAL MACHINERY
PUMPS • HOME WATER SERVICE EQUIPMENT • RAIL CARS
FARM MACHINERY • MAGNETOS



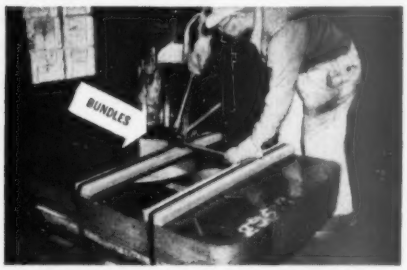
Acme Steel Strapping Insures S.A. *(Safe Arrival)*

Secures tractor parts for long-distance hauling . . . saves time and trouble for International Harvester

STRAPPING ON A TRACTOR. When International Harvester ships crawler tractors on open railroad flatcars, Acme Steel Strapping ties tool boxes, lubrication equipment and seat cushions in place for the journey.



SOLE SUPPORT for these IH Diesel engines is one Acme Steelstrap per engine. It secures the engine to a pallet for easy handling.

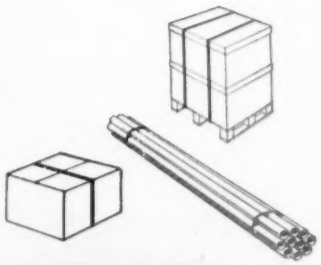


4,000 POUNDS of tractor dashboards are bundled together with Acme Steel Strapping for delivery from one International Harvester plant to another.

Whenever you receive anything secured with Acme Steel Strapping, you know that the shipper has taken care to get it to you safe. He has also beat the threat of damage-in-transit and has cut the cost of packing and shipping, too.

Acme Steel Strapping does all these things. It makes packing and loading easier and faster. It provides better protection during shipment, and helps insure S.A. (Safe Arrival).

Almost certainly, Acme Steel Strapping or Acme Steel Stitching Wire methods can help somewhere in *your* operation. If you have any kind of a shipping or materials-handling problem, we may have just the idea you need. Write Acme Steel Products Division, Dept. FMM-43, ACME STEEL COMPANY, 2840 Archer Avenue, Chicago 8, Illinois.



ACME STEEL

STRAP IT . . . STITCH IT . . . SHIP IT . . . SAFELY!

NOW a J-M Asbestos Smooth-surfaced Roof for dead level decks!

The Johns-Manville Flexstone *Special* Built-Up Roof...

THE J-M Asbestos FLEXSTONE* SPECIAL Roof has been developed for decks from dead level to ½" pitch per foot. It is the result of extensive experimentation in the Johns-Manville Research Center and years of successful tests in the field. Now for the first time you can utilize the proven advantages of the well-known J-M Flexstone Asbestos Roof *on flat or nearly flat decks.*

Smooth-surfaced to afford good drainage and make maintenance and repairs easier!

No gravel or slag—cuts down excess weight and saves labor costs!

Made of asbestos—J-M Flexstone Felts are made of fire-rot-and weatherproof asbestos. They last longer and give more enduring protection.

Won't dry out—Because they are made of mineral asbestos, Flexstone Felts are unique in their resistance to the destructive effect of sun!

For your added protection, the Johns-Manville Asbestile* System of Flashing insures proper treatment of all critical areas. Asbestile is a heavy-bodied plastic cement designed for use with asbestos flashing felts to give thorough water-tightness. As it sets, Asbestile forms an integral part of the wall itself.

Flexstone Roofs are applied only by J-M Approved Roofers. For full information on Flexstone Roofs and Asbestile Flashing Systems, send for brochure BU-68A. Write Johns-Manville, Box 158, Dept. FM, New York 16, N. Y.

*J.-M. Reg. U. S. Pat. Off.

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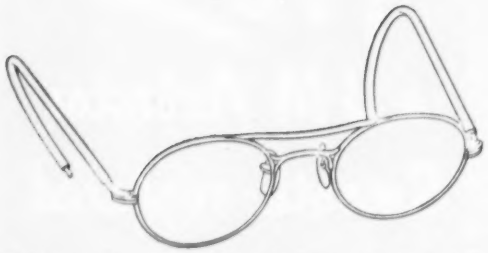
DECORATIVE FLOORS • MOVABLE WALLS • ETC.

WHEN YOU'RE SURE OF THE QUALITY YOU'RE SURE OF THE PROTECTION

Specify metal frame safety eyewear by Bausch & Lomb. There is none better designed, none better made. A few of the basic styles are pictured here. All spectacle types may be fitted with lenses ground to individual workers' prescriptions. Remember, your Bausch & Lomb supplier is thoroughly trained and experienced in solving eye protection problems. Write for catalog showing the complete line: Bausch & Lomb Optical Co., 90116 Smith St., Rochester 2, N. Y.



H-10 For general use in semi-hazardous areas. Non-corrosive white metal frame, drop oval 6.00D curve lenses, rigid double bridge construction, adjustable nose pads, flexible cable-type temples with sweatproof non-flammable insulated covering. Available with Ray-Ban absorptive lenses.

J-11 Same as the H-10 (above) except fitted with non-corrosive wire mesh nose and side screens giving impact protection from every angle. Recommended for use wherever the impact hazard is greatest and most uncertain. Also available with Ray-Ban lenses where glare hazards prevail.

H-30 This is a special Hookover for wear over prescription safety lenses for the purpose of protecting and prolonging the valuable prescription lenses—particularly bifocals. The Hookovers are not supplied with hardened lenses. Available for safety glasses with or without side shields. Also in Ray-Ban.

M-50 Here is the Ful-Vue model in all-metal spectacle also available for use with hardened prescription lenses. Widely used indoors and out where adequate protection against frontal impact is needed, but where smart styling is also a desirable factor. Features similar to H-10 except bridge has auxiliary concealed reinforcement.

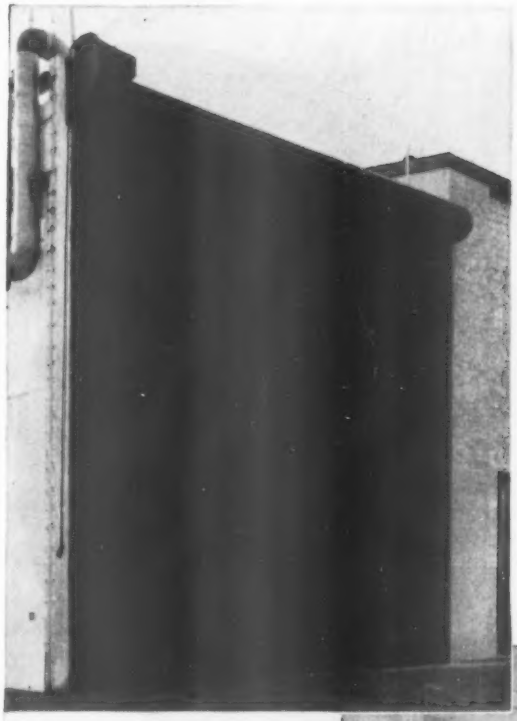
P-57 This is basically the M-50 frame (above) but with Ray-Ban lenses and green acetate side shields for use generally where protection is required from all-angle impact and from harmful rays emitting from welding arcs and other intense light sources. Ful-Vue temples permit unrestricted wide-angle vision.

1853/1953 INTO A NEW CENTURY OF OPTICAL PROGRESS
BAUSCH & LOMB CENTENNIAL

BAUSCH & LOMB *Safety Eyewear*

Rolling Steel Doors

. . . more desirable from ANY STANDPOINT!



For unusual openings, such as the one at the left, and normal truck openings in any type of building, there is no door that offers as many desirable features as a good quick-opening, quick-closing, power operated rolling steel door. Their vertical, roll-up action occupies no usable space either inside or outside the door opening—no overhead obstructions to interfere with crane operations. No other type of door offers these inherent advantages of space economy and compactness in operation. In addition, rolling steel doors are permanent . . . their all-metal construction assures you a lifetime of continuous trouble-free service, and provides maximum security against intrusion and fire. When you select a rolling steel door, it will pay you to check the specifications carefully . . . you will find that the galvanized steel material for the interlocking curtain slats of Mahon Rolling Steel Doors is chemically cleaned, phosphated, and treated with a chromic acid solution to provide paint bond, and, that the protective coating of synthetic enamel is baked on at 350° F. prior to roll-forming. This is just one of the extra-value features of Mahon Rolling Steel Doors—you will find others. See Sweet's Files for complete information including Specifications, or write for Catalog No. G-53.

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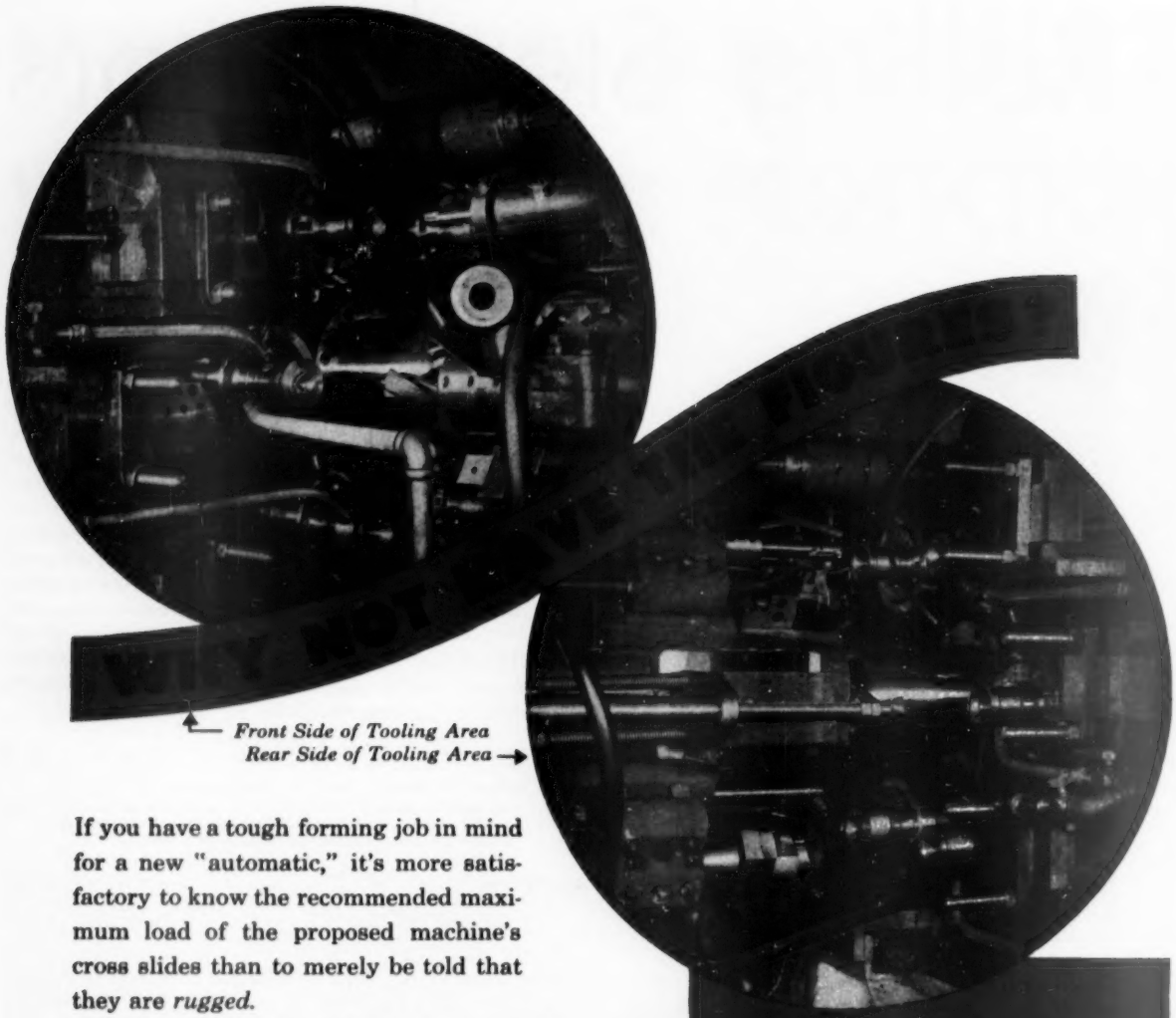
Detroit 34, Michigan • Chicago 4, Illinois • Representatives in all Principal Cities

Manufacturers of Rolling Steel Doors, Grilles, and Automatic Closing Underwriters' Labeled Rolling Steel Doors and Fire Shutters; Insulated Metal Walls and Wall Panels; Steel Deck for Roofs, Partitions, and Permanent Concrete Floor Forms.

Above you see one of two Mahon Power Operated Rolling Steel Doors 30'-0" x 30'-0" installed in a General Electric Test Cell. At right are four Mahon Power Operated Rolling Steel Doors installed in truck openings of an enclosed shipping dock in a new plant for the Detroit Hardware Company.

ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

MAHON



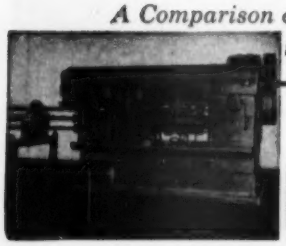
Front Side of Tooling Area
Rear Side of Tooling Area

If you have a tough forming job in mind for a new "automatic," it's more satisfactory to know the recommended maximum load of the proposed machine's cross slides than to merely be told that they are *rugged.*

Before a machine can satisfy an important requirement it must be *built that way.* And built to figures instead of adjectives.

There are many factors involved in the building of any brand of Multiple Spindle Bar Automatic, factors on which you may want the figures. You may have the figures on CONOMATICS.

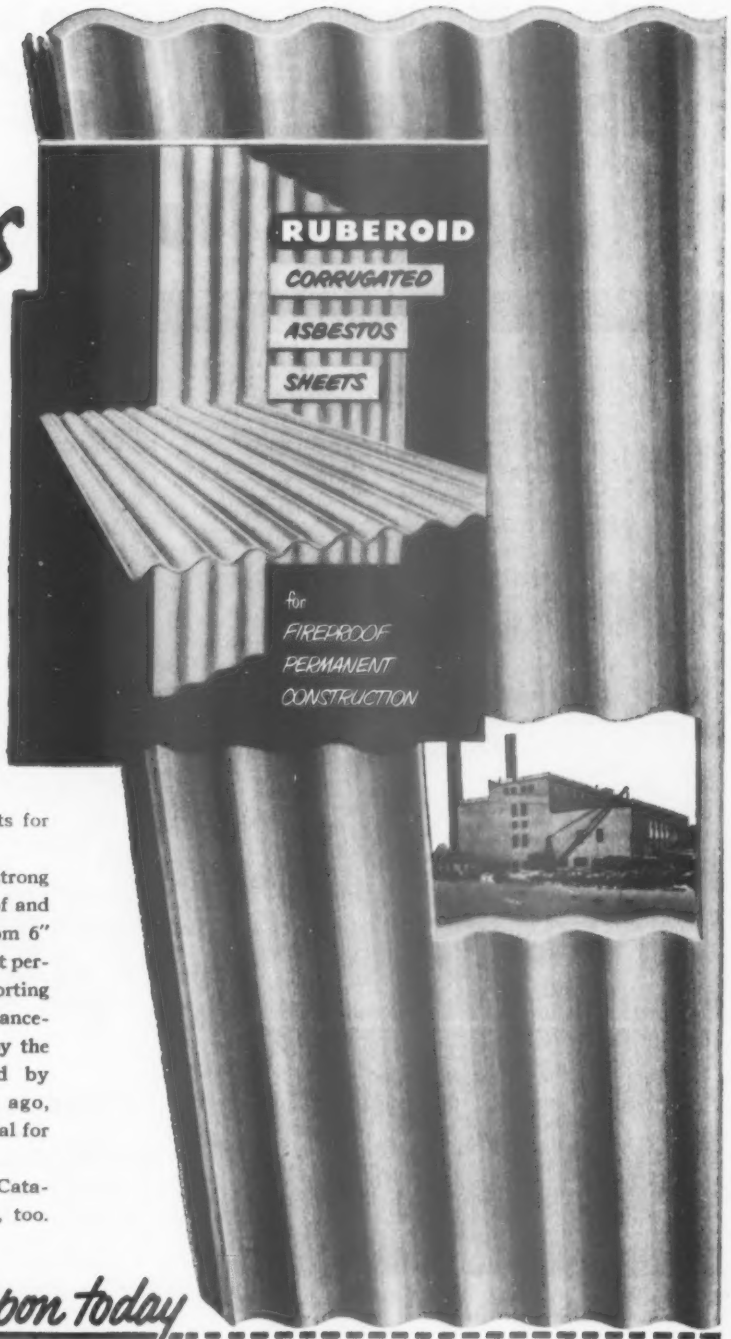
A Comparison of ALL Automatics is in Favor of Cone



In producing the alloy steel part shown, the maximum load recommendation for each main cross slide of the 3½-SIX is 8,000 foot pounds. The total net weight of the main cross slides is 825 pounds.

Conomatic} CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

FOR *Better Buildings* FASTER



Here's the new "Bible" for industrial builders. Here's where you can learn how to cut building time and costs with Ruberoid Corrugated Asbestos Sheets. Here's where *you* can find 32 pages of specifications, assembly instructions, application photographs and detail sketches . . . everything an applicator needs to know about installing corrugated sheets for roofing or sidewalls.

Ruberoid Corrugated Asbestos is strong and durable . . . fireproof, weather-proof and corrosion-resistant. Pre-cut lengths from 6" to 12' speed construction. Its light weight permits the use of lighter weight supporting members and foundations. It's maintenance-free . . . never needs painting. Made by the famous Eternit process originated by Ruberoid in this country 25 years ago, Corrugated Asbestos is the ideal material for all types of industrial buildings.

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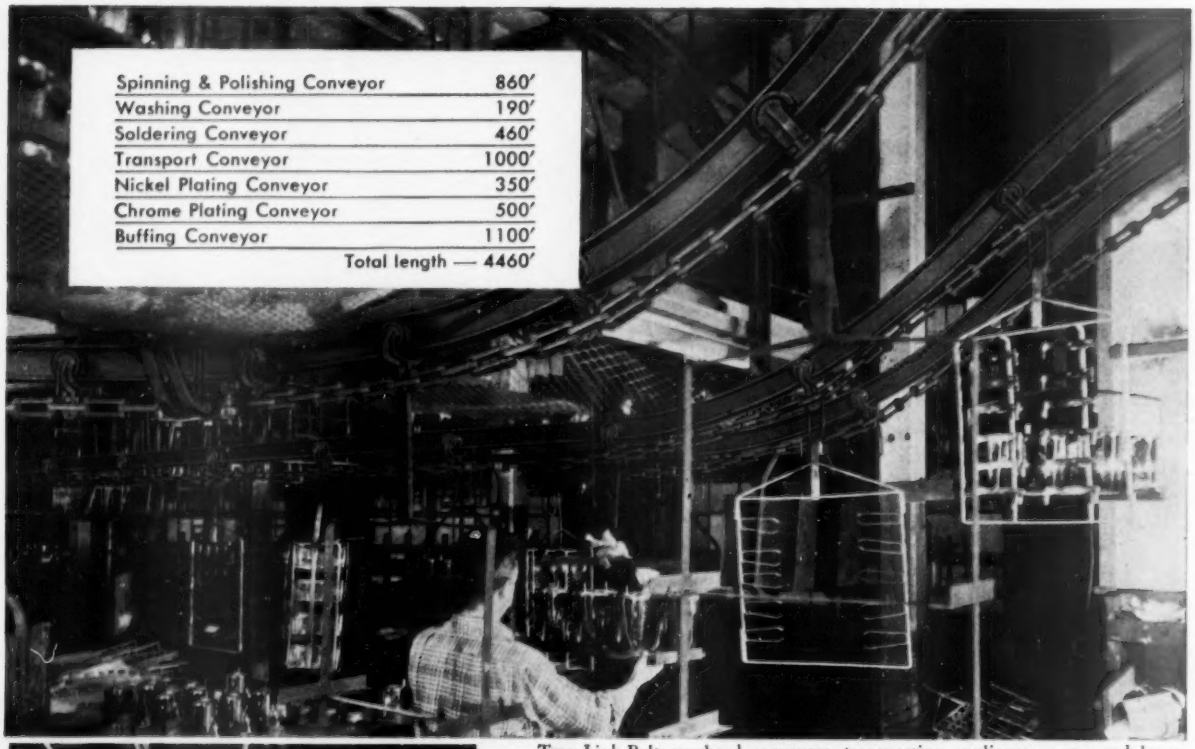
From shaping of raw materials to final assembly...

appliances move on 7 Link-Belt Overhead Trolley Conveyors



Two Link-Belt overhead conveyors, transporting appliances, enter and leave inspection room at this junction.

Conveyor moves percolators through buffing operation with minimum handling.

Overhead conveyor moves automatic electric percolators from plating room to assembly station.

Landers, Frary and Clark step up production, save space in 5-floor plant

THE ease and economy with which Landers, Frary and Clark handle appliances in their five-floor New Britain (Conn.) plant are typical of the advantages of Link-Belt Overhead Trolley Conveyors. Plants all over the country have found these efficient conveyors the answer to increased production at lower cost.

Travel in many paths at synchronized speeds. Straight-line production regardless of physical layout. Conservation of floor space. Release of manpower for production jobs. You get all these, thanks to Link-Belt's vast engineering experience in meeting conveying problems for all industries.

Put Link-Belt's quality products plus engineering ingenuity to work for you. Our engineers will work with you and your consultants . . . help you set up smooth, steady, straight-line production.

LINK-BELT

OVERHEAD TROLLEY CONVEYORS

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities.

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● The casters pictured here are only three of the nearly 1500 different types manufactured by COLSON to meet every industrial materials-handling requirements—*exactly.*

Old, bumpy, hard-to-handle equipment can easily be restored to its original efficiency with a saving of time and money.

Other cost-cutting materials-handling equipment by COLSON includes hand trucks, barrel and drum trucks, platform trucks and Lift-Jack systems. Write us or consult the yellow pages of your phone book (under "casters" or "trucks, industrial") for the COLSON office near you.

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And there are other features which add further to the fine service you get from a WRIGHT *Speedway* Hoist. For instance —grooved cable drum, improved plow steel preformed cable, concealed motor wiring, and completely enclosed, ventilated housing which is weatherproof for permanent outside use. Ball and roller bearings seldom require additional lubricant. Gear train is sealed in oil bath chamber.

You can get standard lift, long lift, or close headroom WRIGHT *Speedway* Hoists in capacities from ¼ to 10 tons — all with these same quality features. See your local WRIGHT distributor or write our York office for **DH-133-A.** WRIGHT will save you money.

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Hoists
Trolleys
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TRUMBULL ELECTRIC

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THE

200 AMPERE

HCI

SAFETY SWITCH

WITH the addition of the new 200 ampere size you can now meet 98% of your switch requirements with Trumbull heavy duty HCI switches. This is of first importance to users who plan their installations as long-range investments in economical operation.

From the day you buy them they deliver complete circuit protection, complete personnel protection, easier and simpler installation and maintenance. And that's not all. The Trumbull HCI heavy duty switch line is not only built for extra long life under severe usage — but deliberately designed to far exceed the present requirements of most users — your guarantee of a sound investment for the future.

Leading Electrical Distributors everywhere stock Trumbull equipment. See your local Trumbull distributor for top values and for alert and cooperative service. For complete descriptive literature, write for Bulletin TEC-17.

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- *Rugged handle has releasable interlock, and is designed to take three padlocks.*
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- *Ample wiring space, easily removable interior unit.*
- *Underwriters' Laboratories, Inc. listed.*
- *Available in 30, 60, 100 and 200 ampere ratings; fusible and no fuse.*
- *Meets NEMA Type A and 1A Standards.*
- *Convenient concentric knockouts.*

Concentric Knockouts — Convenient, Cost Saving

Concentric knockouts, permit accurate location of conduit entrances for easier, faster installation. They permit maximum standardization in manufacturing and minimum distributor stocking, thus contributing to lower prices.

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TRUMBULL ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY
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Putting Air to work for Sharp & Dohme: Germ-free air is essential. Just "fresh air" won't do in the world's largest plasma plant.

6000 MILES AWAY

PURE AIR FIGHTS BATTLE SHOCK

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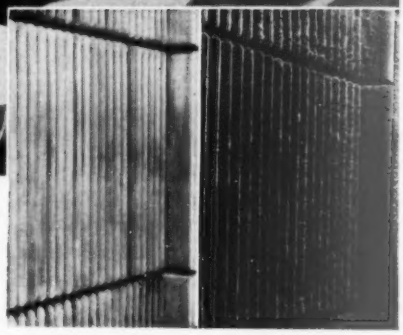
You can *put air to work*, too. Westinghouse has the equipment to handle it. For data on air cleaning, air handling or air conditioning products, ask for Catalog 600. Call your local Westinghouse-Sturtevant office. It's listed in the Yellow Pages. Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Mass.



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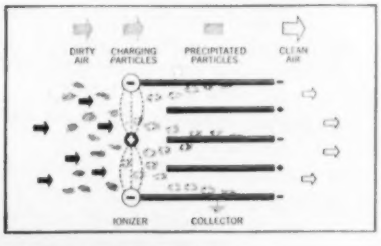
Here's How PRECIPITRON Works—All dirt particles in the air stream are charged and attracted to collector plates of the opposite polarity. The above photos show how much dirt is collected in 2½ weeks of cleaning "fresh air".

The PRECIPITRON is the most efficient air cleaner available commercially for removing impurities from normal air.



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YOU CAN BE SURE...IF IT'S Westinghouse

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So multiply your steel buying efforts and make one call do the work of many. Contact your nearby Ryerson plant for all your steel needs. Our ability to help may surprise you.

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LOOKING AHEAD IN LABOR

Last-minute round-up as we go to press

Don't worry about what Congress will do to Taft-Hartley. The "balancing" will net more tightening than relaxation. That is, if Congress does anything at all this session.

President Eisenhower handed Congress the ball after his labor-management-public advisory committee fell apart. And Sen. Taft is calling the signals. Taft may not put over everything he wants. But he can block anything he doesn't like.

•

These tightening amendments were gaining support at press time:

- A "states' rights" bill giving life to more restrictive state labor laws regulating strikes and picketing. Courts have held Michigan, Wisconsin, and other state laws invalid simply because Taft-Hartley covered the same ground.
- A special procedure outside Taft-Hartley for disqualifying any Communist-dominated union, whether or not officials are proven Commies.
- Free speech for employers in election, as well as in unfair practice, situations.

Of course, you may get some amendments labor will applaud: Voting rights for "economic" strikers. Discretionary, rather than mandatory, injunction against secondary boycotts. End of non-Communist affidavits for union leaders.

Taft-Hartley's real strength will stay: Injunctions against unfair labor practices and national emergency strikes. Unfair practice charges against unions as well as the boss. Free speech. Closed shop ban. Rights for individual workers.

•

Organized labor has its hands full fighting another wave of state legislation like that which swept the country when T-H was passed. Some 13 states now forbid compulsory union membership.

Labor leaders helped defeat a "right to work" bill in Wyoming. They hope to do the same in Utah, Oregon, Oklahoma, Iowa, and Indiana.

Blocking restrictive labor laws in state legislatures becomes more important under the Republican Administration. There is more talk of returning labor problems to the states. And most state governments are conservative Republican.

AFL-CIO unity is still years away—if it comes at all. Talks now in progress are mainly for public consumption. No results are expected soon.

CIO has laid down four conditions: CIO's industrial unions must not be partitioned. Jurisdictional machinery must be set up. AFL unions must end discrimination. AFL must clean out racketeers.

CIO wants all this *before* merger. AFL says, let's merge first, then iron out differences. That's a preliminary hurdle that may never be cleared.

•

Discount rumors David McDonald may pull his Steelworkers out of CIO, put them in AFL. He and Walter Reuther are getting along better than they did before Reuther won the top CIO post.

One major shift to AFL occurred at Minneapolis-Honeywell. Big 8000-member local of CIO electrical union switched, surprisingly, to AFL's teamsters. Result of bitter differences between local leaders and Union President James Carey.

•

To nobody's surprise the Labor Department's Advisory Committee fizzled.

Industry felt it should not have got into the Taft-Hartley issues.

Labor leaders aren't happy, either. They like their man Martin Durkin as Secretary of Labor. But they'd like to see the White House listen to him more, push Congress harder on Taft-Hartley.

•

Watch for political appointees to the Federal Mediation and Conciliation Service. David Cole was forced out as FMCS chief. Congress had this gripe against him: He took on new conciliators without clearing through their Congressmen. They are not under Civil Service.

•

Productivity increase of four cents an hour for railroad workers does not set precedent in other industries. Nor does it establish principle, even on railroads. Arbitrator acted under specific clause in existing agreement. Issue will be fought in negotiating new contract before Oct. 1.

SEE PRACTICAL LABOR RELATIONS, PAGE 222

LOOKING AHEAD IN BUSINESS

Last-minute round-up as we go to press

Manufacturers plan to increase capacity by 16% between now and 1956, and they expect sales to increase 10% in the next four years. This is not a forecast but a statement of plans and expectations based on the sixth annual McGraw-Hill survey of capital expenditures.

Biggest expansion in capacity is being planned in the electrical machinery, transportation equipment, and chemical industries. Automobile and machinery makers will expand faster than the average of all industry over the long pull, 1953-56. The oil industry, long regarded as the pacesetter in business, will grow at about the average rate along with the rest of the economy. Steel and non-ferrous metals are definitely slowing down.

Industry plans show definite transition from military to consumer production. Defense-supporting industries, which expanded the most rapidly in 1950-52, are slowing down. Consumer durable-goods industries, such as autos and electrical equipment, plan sizable new expansion. Consumer soft-goods industries, such as food and apparel, expect to make modest increases.

•

Businessmen feel that there are larger markets ahead. This may be part of the reason for the plans to increase capacity. Survey totals show that manufacturers expect sales to increase 10%, on the average, in their industries.

Many firms, however, plan to grab a bigger share of the market for themselves. When sales plans of individual firms were added up, it showed that manufacturing managers expected to increase their own company sales by 13%. Clearly, a new competitive element is entering the market if individual manufacturers plan to sell 13% more in the next four years at the same time that they expect sales in their industry to go up by only 10%.

The greatest differences between company sales plans and expected industry sales were found in the automobile, machinery, and chemical industries. Other lines showing a strong expectation of competitive growth by the company at the expense of the industry are baking, brewing, cereal manufacture, engines, service machinery, special machinery, wool textiles, dyers, knitters, building materials, cement, furniture, and non-ferrous metals. By contrast, the steel and electrical machinery companies expect their sales to grow closely with the industry growth.

If these sales expectations of businessmen are borne out, competition can be expected to stiffen in the future. Businessmen report numerous new products and new processes, which may be the means of dealing with this coming competition. New products help to expand markets, and new processes help to lower production costs.

Automotive engine makers are experimenting with gas turbines. Petroleum companies expect to make large investments for catalytic reforming to improve motor fuels. Food companies are going in for high-temperature, short-time canning and also for continuous baking ovens. Railroads expect large investment in centralized traffic control. Textile factories expect drastic changes in spinning mills and looms. Transportation equipment companies have large expectations for high-pressure rubber-forming presses. This is only a small sample of the many products and processes reported in the survey.

A strong capital-goods market is the result of these plans for new capacity, new products, and new processes. Businessmen plan to increase the dollar amount of capital expenditure by 6% over last year, raising the total to $23.3-billion in 1953. Capital spending plans already projected for 1954-56 amount to well over $18-billion each year. This compares to $14- to $16-billion spent on capital goods in the peacetime prosperity of 1947-50.

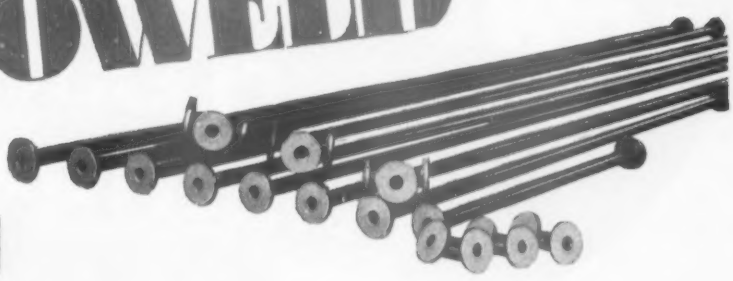
•

A sharp shift toward modernization is taking place. Modernization is expected to take 57% of capital outlays in 1953 compared with 42% in 1951. Steel, transportation equipment, food, and textile industries particularly show a strong tendency toward modernization expenditure.

Rising capital expenditure plans give a new lift to the business outlook for 1953. But the sales, capacity, and modernization plans indicated in the survey also caution the individual factory manager to give attention to stepping up his productivity or output per man-hour.

You Can Save More with

PLIOWELD



Lined Piping

WHEREVER you handle corrosives, abrasive materials and other enemies of metal piping, it will pay you to investigate the savings you can make with PLIOWELD—Goodyear's lining material that bonds *permanently* to metal surfaces.

7 REASONS WHY
THE G.T.M. SPECIFIES PLIOWELD

1 Effectively seals in corrosives that cannot be handled in metal

2 Bonds permanently to metal surfaces—an exclusive Goodyear process

3 Does not split or loosen with vibration or severe external impacts

4 Does not crack or buckle under alternate wetting and drying or under temperature changes

5 Surface will not disintegrate or slough off—*cannot ever contaminate in-process materials*

6 Protects product from discoloration, iron "pickup" and other contaminants

7 Each installation specially formulated to provide maximum protection against chemical handled

The G.T.M.—Goodyear Technical Man—will gladly discuss your problem—and recommend a PLIOWELD lining matched to your needs that will give you these benefits:

LOWER OVER-ALL COST because the useful life of PLIOWELD lined pipe so far exceeds unlined pipe that its slightly higher initial cost is more than made up by your savings in replacement outlays.

LOWER MAINTENANCE COST. Because PLIOWELD is absolutely impervious to corrosion, daily inspections and frequent maintenance shutdowns are eliminated. *The savings this means should cover the cost of PLIOWELD lining in a short time.*

IMPROVED PRODUCTION where PLIOWELD lined pipes handle production items. Your product is protected against taint and discoloration because the lining won't slough off or contaminate liquids.

Ask the G.T.M. about PLIOWELD lined pipes, fittings and equipment—everything from laboratory equipment to rail tank cars—or write Goodyear, Mechanical Goods Division, Akron 16, Ohio.

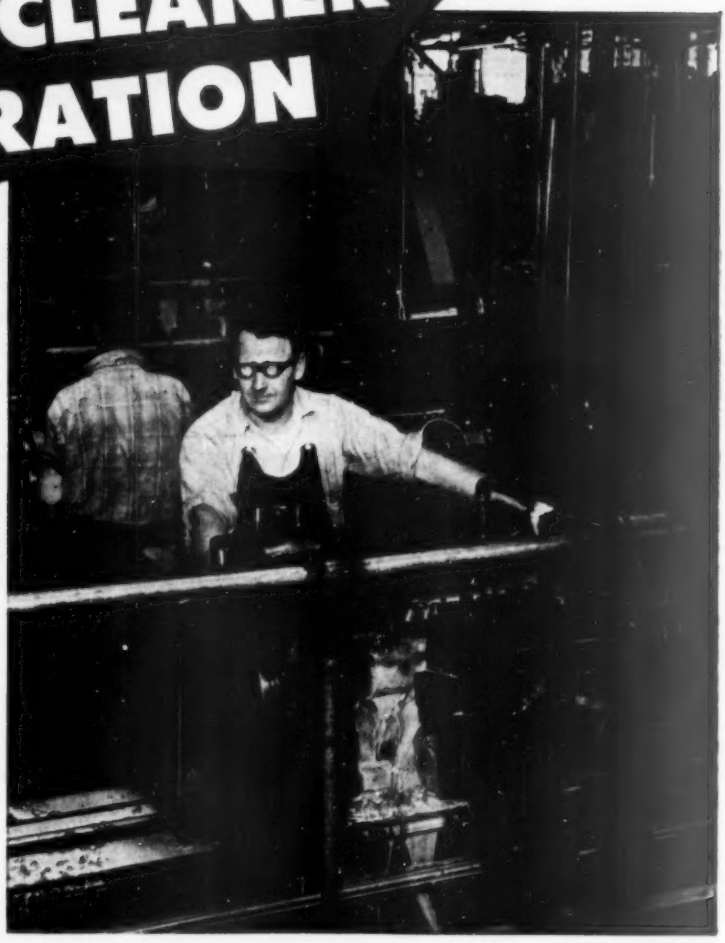
Plioweld—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR

THE GREATEST NAME IN RUBBER

INTERNATIONAL HARVESTER reports:

LOWER COSTS AND MUCH CLEANER OPERATION



...with TEXACO SOLUBLE OIL

At the recommendation of a Texaco Lubrication Engineer, a test of *Texaco Soluble Oil C* was made in the International Harvester Company's Fort Wayne plant.

> "Results were outstanding," International Harvester reports. "With *Texaco Soluble Oil C,* lines stay clean —formerly flushed every two weeks, now flushed only twice a year. Tool life has increased. There is no appreciable odor problem."

Everywhere, *Texaco Soluble Oils* are noted for the stable emulsions they make, for the better machining results they give. There is a complete line of *Texaco Cutting, Grinding and Soluble Oils* to enable you to do every type of machining better, faster and at lower cost.

Let a Texaco Lubrication Engineer specializing in metal working give you full information. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO CUTTING, GRINDING AND SOLUBLE OILS FOR FASTER MACHINING

TUNE IN: Tuesday nights on television—the **TEXACO STAR THEATER** starring **MILTON BERLE.** See newspaper for time and station.

FACTORY MANAGEMENT AND MAINTENANCE

HARRY LEE WADDELL, EDITOR

What About Productivity as a Wage Base?

THERE'S BEEN A LOT OF TALK lately about the wisdom and practicality of tying wages to productivity on a formal basis—along the lines of the five-year General Motors contract with the UAW-CIO. We'll be hearing more about this contract in the newspapers, too, because of the bargaining between GM and the union to revise it far in advance of its 1955 expiration date.

The arguments get pretty technical—at least until the shouting starts. But what seem to us to be some basic facts about the matter are not complicated. To provide a basis for better understanding the contensions about productivity's proper relation to wages, let's take a look at these facts:

1. Increases in productivity—that is, output per man-hour—have made possible our tremendous rise in standard of living. We are able to buy more goods and services per capita (double our ability of 50 years ago and 42% greater than in 1929) because we are turning out more goods and services per capita—in the face of large reductions in the workweek.

2. Our increased productivity has not been accomplished primarily by harder work, but by greater mechanization and more efficient organization of work. This means that larger capital investment and better management have been prime factors in increasing productivity. But it does not minimize the contribution of workers at every level—in adaptability to changing (1) work methods, (2) social patterns, (3) educational demands, (4) job locations, etc.

3. Our upward progress in productivity has by no means been steady. It has been extremely jerky—with many periods of no gain, and even some of decline.

4. It has been far from uniform as among various industries, and among various companies in the same industry. This is one of the dramatic facts that recent statistical analysis has made plain. (More about this in next month's issue.)

5. Our measurements of productivity are far from perfect. We have nowhere near the statistical data we need to measure short-term changes accurately. Nor have we refined the techniques of measurement. But there are signs we are beginning to lay the groundwork for some progress in this analysis.

6. There are several basic ways to distribute the fruits of increased productivity. The important ones are through profits, wage and salary increases, lower prices, and social benefits such as shorter working hours and various types of "social security." All are necessary. Profits provide the incentive and the wherewithal for increased capital investment to make still further increases in productivity possible. Wage and salary increases reward those directly involved in the productive enterprises, though not necessarily on the strict basis of personal contributions to increased productivity. Social benefits tend to distribute some of the gains widely, and lower prices widest of all.

7. There is the greatest difficulty in tying any distribution of productivity gains—through profits, prices, or wages—directly to short-term changes in productivity. But if we could achieve it, we would have made great economic progress. It is certainly a worthwhile goal — but we're far, far from it.

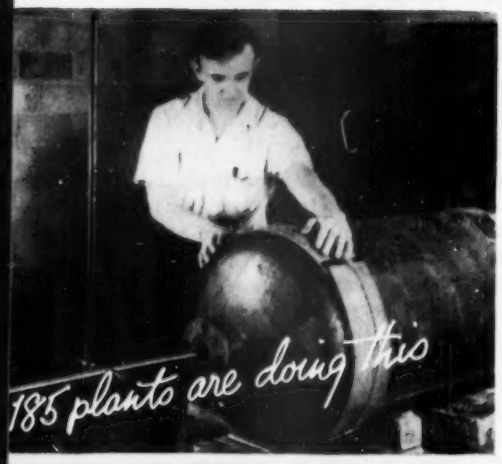
8. Meanwhile, the varied forces of competition in our lively capitalistic system have been doing a pretty good job of getting the proceeds of increased productivity distributed fairly. There have been some bad rough spots, of course, when the distribution has been anything but fair—for specific economic groups, and for the general welfare of all.

9. If we are willing to admit that we'll never have perfect distribution—absolutely fair to every single person in the long-term best interest of all—then we can make some real progress toward better and better distribution. Experimentation in methods of distribution then makes sense.

Harry Lee Waddell

How you, too, can use...

RADIOISOTOPES



USING RADIOGRAPHY to test for flaws in metals. Cobalt 60 is the radioisotope used here to test welds in containers with small apertures.

MEASURING THICKNESS with beta ray gage as material passes. Radioactive isotope used here is strontium 90.

LOCATING LEAKS in buried piping (in this case, a radiant heating system). Radioisotope used here is sodium 24.

You might say...

"There's nothing in it for me."

But there can be—if you have problems in inspection, quality control, chemical process control, if you make anything in continuous sheet, if you want to keep your maintenance department up to date. (See page 86.)

"That's strictly lab stuff now."

But it's not, by a long shot. Take a look at FACTORY's survey. You'll see that not only are companies using radioisotopes to solve plant problems today, but they're doing it right in the plant, not in the laboratory. (See page 88.)

"Too dangerous. I'm afraid to start with it."

But you shouldn't be. Radioisotopes are no more dangerous than any of the other potential hazards you now have under control. A high-voltage line is dangerous, too. So are toxic chemicals. But you manage to protect against them. And protecting against radioisotopes won't be especially involved for you. (See page 90.)

"Don't want to hire an atomic physicist to tell me what to do."

But who said you had to? FACTORY's survey points out that most plants don't have specialists in radioactivity. They hire an outside consultant. And they rely on operating people with little more information on the subject than they get, in many cases, from Atomic Energy Commission literature. (See page 92.)

"Costs too much to get into the act."

But it doesn't. Costs some to get started. So does any piece of new equipment you need for a new technique. But isotopes can pay off, and pay off fast in material

By NORMAN WEISSMAN • Assistant Editor

saved, in better product quality, in less rejects, in less labor, in lower-cost maintenance. (See page 88.)

"I won't know what to do when something goes haywire."

But you will. In most cases you'll be able to correct the trouble just as you would on any other electronic or electrical equipment. The radioisotope is a foolproof source. Only spot trouble can develop is in the rest of the equipment. (See page 92.)

"Too much government red tape."

But there's actually very little. You use the isotopes only if AEC is satisfied you can handle them safely and effectively. To prove to AEC that you can, you have to submit a written form answering a series of questions. And there's no further red tape. (See page 94.)

"I'll lose customers if they think my product may be radioactive."

But you can relax on that score. No chance for your product to have any radioactivity if it is merely exposed to radiation. Where you use the radioisotopes in processing—where they become a part of your product—you choose such a radioisotope and use it in such a way that there's no more radioactivity in your product by the time it's sold than there is in an ordinary glass of milk. (See page 95.)

"Don't want to get mixed up in one of those 'hush-hush' security deals."

But there's nothing of the kind. Companies that use radioisotopes have no security problem. No screening of employees, no silence about plant processes. (See page 94.) *Turn the page*

What is a radioisotope?

It's just about any chemical element
that has been exposed to radiation
in an atomic pile
or to bombardment in an atom smasher
until it has been made radioactive.

The only difference between it
and an ordinary bit of the same material
is the radioactivity.

You can heat it
. . . pour it (if it's liquid).
. . . or saw it (if it's solid)

It's still the same bit of material
and it's still radioactive.

What can it do?

You can use radioisotopes in two ways:
1. As a source of radiation
you make use only of the rays given off . . .
. . . to follow liquid flow
. . . to locate leaks in pipe buried under concrete
. . . to turn on a pump
. . . for gaging
. . . for radiography
. . . and in many other ways.

2. The second use is as a tracer.
It acts like a radio station
with a geiger counter as the receiver.

Minute amounts of it
tell you with great accuracy . . .
. . . when your product is fully mixed
. . . when changes — chemical or physical — occur
. . . when your process is working properly
. . . and lots more.

This time you mix the radioisotope
throughout the product.
It doesn't change the product or the process.

And the radioactivity
that acts as your source of many bits
of heretofore hidden information
is still there — mixed throughout your product
to measure or locate at your will.

28 Ways You Can Use Radioisotopes to Solve Operating Problems

• **If an expert** in radioisotope utilization were to visit your plant today, he'd probably find lots of ways you could use radioisotopes with profit. Here's a list of some uses. Maybe you've a tough problem radioisotopes can help solve. Check this list and be your own expert—for the time being, anyway.

• **All aren't in use today.** Some are in the research labs. Others are on the drawing boards. But every one is the answer to one of today's operating problems. And every one could be put to use today.

• **This list is by no means complete.** Its main purpose is to point out the *kinds* of jobs isotopes can do. If you have a related problem in your plant, you'll know it's worth while investigating radioisotopes. And the list may even help you find new uses for man-made radioactive materials.

If your problem is . . .	You can solve it with radioisotopes
Controlling materials in a process	
1. Measuring relative amounts of materials in a mixture.	Add a small quantity of radioisotope to process component you want to measure. Measurement of radioactivity of mixture will register relative amount of the component.
2. Controlling density of process solutions.	Radioactivity density gage can be used for measurement or control. Works even on solutions in closed tanks.
3. Detecting impurities.	Isotope tracers added to contaminant will spot minute amounts of impurities left in process.
4. Controlling a mixing operation.	Add radioactive tracer to one of the components being mixed. Take samples of mixture and expose to geiger counter (an instrument that measures radiation intensity). It will give you an extremely precise measure of homogeneity of mixture.
5. Controlling strength of chemicals in electroplating.	Add isotope to bath to measure ion concentration. Measurement of radioactivity of mixture with geiger counter will tell you strength of solution.
6. Controlling quality of alloy composition.	Add isotope to each alloying agent. To learn how much of each is present, measure radiation rather than make chemical analysis. Extremely small, nondangerous quantities of isotopes can be used in this technique.
7. As a catalyst.	Radiation is used as a catalyst in the polymerization of resins.
Gaging and controlling thickness of continuous sheet material	
8. To control thickness of paper, rubber, plastic, sheetmetal, and other products as they come off the production line rolls.	A beta ray* gage will give an accurate measure of product thickness. Where it's desirable to have only one side of the product exposed for measurement, a backscatter-type gage will do the job. Gage can easily be hooked up with feedback control to make necessary adjustment automatically.
9. Making profile measurements.	Scanning beta ray gages make continuous records of thickness profiles of sheet, tire-tread extrusions, coated abrasives, and many other products.
Controlling coatings automatically	
10. Measuring and controlling thickness of coating on products made in continuous sheet.	Beta ray gage will give measurement of coating thickness of adhesive tape on cotton, glaze on paper, etc.
11. Controlling metal and ceramic coating thickness when dipping product.	Add minute amount of isotope to coating solution. Dip product. As product moves down assembly line, geiger counters are actuated. Strength of signal could control specific gravity of dipping solution and dipping time.
12. Measuring thickness of tissue-thin coatings of silver on radar equipment with accuracy of 10-millionths of an inch.	Silver coating is made radioactive, then exposed to geiger counter. Quantity of radiation is measure of silver-coating thickness.
Making superfast, superaccurate analyses	
13. Keeping continuous check on the distribution of phosphorous (and sulfur) between slag and metal in open-hearth or other steel production process.	Add small amount of radioactive phosphorous or sulfur to the molten bath. Phosphorous goes into the slag. Percentage of element in the slag can be determined by measuring radioactivity of samples removed at intervals.

* There are several types of rays emitted by radioactive materials. Gamma rays are the most penetrating—and potentially the most dangerous. They will go through thick metals. Beta rays are less penetrating than gamma rays. They can be stopped by any thin material. Alpha rays are still less penetrating than beta rays.

• **Most applications** lend themselves very well to the automatic controls. A geiger counter will tell you at any point how much radioactivity is present. And signals from a counter can be used to operate feedback controls and to actuate other mechanisms.

• **But don't use radioisotopes** if there's another economically practical way to do a job. Although the problems you'll face with radioisotopes are not tough ones (as you'll see farther on), they're still problems. The liquid-level gage (No. 23, below) will work. But so might a gage operating on an electronic principle—perhaps with lots less trouble. Even AEC warns against overselling radioisotopes on this score.

But you'll find lots of things radioisotopes can do that just can't be done in any other way.

If your problem is . . .	You can solve it with radioisotopes
14. Making fast pollution measurements in streams.	Add small quantity of radioactive material to what you're dumping. Then take a sample of water you want to check for pollution and expose to geiger counter. No radioactivity generally means no pollution.
To measure and control flow	
15. Signalling process equipment in automatic control.	Radioactive tracer elements are used to provide automatic switching in process lines. Radioactive material activates geiger counter. This, in turn, actuates valves and pumps.
16. Measuring circulation rate of fluids or gases.	Place radioactive beads in mixture. A geiger counter can detect the beads in passage from outside container, and circulation rate can be computed. Also could be used to control circulation rates if counter is connected to feedback control.
17. Locating leaks in pipelines buried under concrete without test digging.	Inject short-lived isotopes into pipeline. At point of leak, radioactive material will flow out into the ground. Geiger counter will locate this point even through heavy layer of concrete.
18. To map sewers and other underground lines.	Inject radioisotope solution into line. Then check with geiger counter along surface. Path of radioactivity will give you path of pipeline.
19. Metering fluids.	By adding a radioisotope tracer to your pipeline and measuring time elapsed in passing between two geiger counters, you can tell how fast your fluid is flowing.
Ionizing air or other gases	
20. Making gas-discharge tubes or as fluorescent lamp starter.	Small quantity of radioisotope in tubes makes the air or gas inside tube an electrical conductor at all times. This speeds gas discharge and fluorescent lamp starting.
21. Eliminating static build-up on process equipment.	Radioactive materials that emit alpha or beta rays will bleed off large quantities of static electricity from paper machines, textile equipment—any place where static can cause a production headache or an operating hazard.
"Seeing through" thick pieces of metal	
22. Welding in tank construction.	Radiographs will give record of welding quality over a complete welded tank of any size.
23. Measuring liquid level inside closed tanks.	Float inside tank has isotope attached. Greatest activity of geiger counter moving up and down outside tank will indicate liquid level.
24. Checking corrosion or scale formation in closed tanks or pipes without any dismantling.	Reflection or transmission-type gamma ray gage will measure wall thickness at any point.
25. Routine production inspection of thick castings or forgings.	Radiographic examination by isotopes is readily adaptable to production-line jobs on assemblies, castings, and weldments.
26. Watching and controlling crystal growth in heavy-walled steel vessels.	Cobalt 60 radiographs show how crystal growth is proceeding and when to terminate the run.
Locating hard-to-find materials	
27. To segregate scrap according to alloy.	Add small quantity of radioisotope to the metal you'll later want to locate. You can pick it out in seconds with geiger counter.
28. To locate jammed carriers in pneumatic tube delivery systems.	Apply small quantity of radioisotope permanently to carrier. To locate where carrier is jammed, just check length of system with geiger counter.

For survey of radioisotope use today, turn the page

How 80 Companies Are Using Radioisotopes Today

Does it pay to use radioisotopes? That's what FACTORY wanted to know. So we got up a questionnaire with the kinds of questions you'd want answered. We sent it to 80 companies using radioactive materials.

Here are the results. You'll note that the answers have been divided into three major industrial uses for radioisotopes today:

- As a beta ray source (low penetration in a fully-enclosed source, no handling)
- As a gamma ray source (high penetration, controlled handling)

As a Beta Ray Source... 18 Companies

(Fully enclosed source, low penetration)

APPLICATION?	**In chemical analysis for oil co.**	**1**
	In quality control for chemical co.	**1**
	In thickness gages for paperboard, rubber sheet, paper, paint, coatings, steel sheet, plastic films	**16**
WHAT PROCESS DID USE OF RADIOISOTOPES REPLACE?	Chemical analysis	1
	Recorders	1
	Gaging by hand	6
	Mechanical gages	4
	None	6
HOW LONG SHOULD IT TAKE THE INVESTMENT TO PAY FOR ITSELF?	**Two years**	**11**
	Longer	**3**
	No direct return	**2**
	Doesn't say	**2**
WHAT PRECAUTIONS ARE TAKEN?	Film badge indicators	0
	Radiation survey meters	3
	Protective devices	13
	Radiation safety education	7
	Others	1
	Doesn't say	2
EMPLOYEE OBJECTIONS OR FEARS?	**Yes**	**3**
	No	**15**
	Doesn't say	**0**
What were they?	**Misunderstanding based on hearsay**	**3**
How were they overcome?	**Education**	**3**
DO YOU HAVE A TRAINED SPECIALIST IN RADIOISOTOPES?	Yes	6
	No	12
	Doesn't say	0
If not, who does handle?	Chief tester, equipment supplier, electronics engineer, quality control man, electrician, operating supervisors, lab personnel	
If yes, is he outside consultant or company employee?	Outside consultant	2
	Company employee	4
If he's a company employee where did he get his training?	*ORINS	1
	University	2
	University & training with equipment supplier	1

*Oak Ridge Institute of Nuclear Studies

- In research and in manufacture of isotope compounds and products incorporating radioisotopes (more handling, "open" radioactive source)

The grouping was made because the problems associated with each group are different. You'll find out why later.

Don't get the idea that this survey covers all the companies using radioisotopes. More than 185 companies have been authorized to use radiocobalt for radiography. And more than 150 companies have been authorized to buy beta ray thickness gages for measuring and controlling a wide variety of products. Hundreds more companies are using radioisotopes to solve many types of research problems.

Use of man-made radioactive materials is increasing at a fast rate. Between August 1950 and August 1951, use of cobalt 60 for radiography increased 387% over the total amount shipped during the first four years of AEC's isotope distribution.

As a Gamma Ray Source ... 28 Companies (Controlled handling of source, high penetration)		In Research and Products ... 34 Companies (Free amounts of radioisotopes)	
Radiography of weldments, castings, or forgings	27	Applied research	24
For measuring metal wall thickness	1	Fundamental research	2
		Manufacture of isotope compounds	4
		Manufacture of products that incorporate radioisotopes	4
Fracture and examine	2	Didn't replace any, opens up new fields of investigation	6
Supplements, augments, or partially replaces X-ray or radium	20	Radium	2
None	6	Slower methods of analysis	5
		X-ray	2
		Doesn't say	8
		None	11
Two years	25	Two years	9
Longer	1	Longer	15
No answer or doesn't say	2	Can't tell	3
		Doesn't say	7
Film badge indicators	17	Film badge indicators	22
Radiation survey meters	23	Radiation survey meters	30
Protective devices	21	Protective devices	22
Radiation safety education	18	Radiation safety education	23
Yes	11	Yes	8
No	16	No	26
Doesn't say	1		
False fears about dangers of sterility, skin disease, other unknown injuries	9	Misunderstanding based on hearsay	8
Abnormal blood count (from another source)	1		
Doesn't say	1		
Education (talks, pamphlets)	7	Education (talks, demonstrations of safety precautions)	8
Medical exam	1		
Not overcome, transfer	3		
Yes	19	Yes	33
No	8	No	1
Doesn't say	1		
Metallurgist	5	Quality control supervisor	1
Operating supervisor	2		
Chemist	1		
Outside consultant	0	Outside consultant	2
Company employee	18	Company employee	31
Both	1		
*ORINS	2	*ORINS	15
Prior experience with radium or X-ray	8	Prior experience	3
Self training	3	Universities	6
University	3	AEC training	2
AEC	1	Self training	1
Doesn't say	2	Doesn't say	4

For the problems you'll face and how to lick them, turn the page ▶

SAFETY TRAINING can be simple and informal in your plant. Here group leader shows employees how survey meter works.

HOW MUCH RADIATION do you have at any area in the plant? Point a survey meter at the spot for an instant, accurate check.

What You Need to Know . . .

. . . about the Safety Problem

Why the Natural Fear of Radioisotopes?

Trouble stems from the connection everyone makes between the lethal atomic bomb and any other use of "atomic energy."

The comparison is hardly accurate. It's about like comparing the shock you can get from a high voltage line with the one you get when you touch metal after shuffling across your living room rug.

Radioisotopes won't explode, catch on fire, or corrode their way through a lead container. Think of them as useful tools, not as first cousin to the world's No. 1 weapon of destruction.

Is Safety Going to Be a Big Problem?

Not nearly as big as you might think, for two reasons:

1. Most industrial applications will not require high levels of radiation. And the safety problem you'll have is as big as the quantity of radiation you'll be using in your shop.

Here's an example: To mark boundaries of different grades of oil in a pipeline, Standard Oil of California injects a radioisotope into the line.

The amount of radioactive material used for this application is so small that the radiation it emits is less than that of an ordinary luminous watch dial. Yet it's effective enough to give the necessary signals to a geiger counter or other equipment—without constituting a hazard.

Of course, in radiography work, where fraction of a curie amounts or more are needed to penetrate thick castings, there is cause for some concern. Industry, however, has been using X-rays and radium—just as powerful, just as dangerous as cobalt 60—for many years with great success and little difficulty.

2. The radioisotopes come to you in the form of some ready-to-use tool. Meters, gages, capsules, and other equipment incorporating radioisotopes are very often made by your supplier so that the hazards can be easily controlled.

The insurance companies don't think there's any special danger in using radioisotopes. They will insure a plant using them against fire and accident without increasing plant rates. Neither are individual life insurance rates affected for employees who work with radioisotopes.

You've been protecting employees for years against the hazards of handling large quantities of toxic materials, heavy machinery, and the like. Your people will be immediately adaptable to meeting the potential hazard of using radioisotopes. You can count on that.

DAILY CHECK insures people against overdosage of radiation. Employee hands pocket chamber to supervisor for reading.

LITTLE RADIATION escapes from this 10¾-in.-high lead storage container. It's just one of many protective devices.

How Much Radiation Is Safe?

Up to 0.3 roentgen a week, says the Atomic Energy Commission. (A roentgen is a measure of radiation dosage.) **This rate of exposure would cause no injury to personnel even if continued for a lifetime.** In fact, you can take hundreds of times that amount at any one time without injury.

A dentist showers your jaw with more radiation during a tenth of a second exposure to an X-ray machine than you'll get in several years of exposure to the 0.3 roentgen-a-week maximum. Though it's not as hazardous as whole-body exposure, it gives you an idea of the big safety factor.

How Do You Make Sure You're Safe?

Here are four simple and effective ways to protect against radiation danger:

RADIATION SURVEY METERS. These instruments will tell you how much radiation you have at any point in the plant.

There are many such instruments on the market selling for anywhere from about $200 to $500. AEC requires plants using radioisotopes to have such a survey meter available. That does not mean the plant must have its own. If the plant has an outside radioisotope consultant, it can use instruments which he undoubtedly has.

PROTECTIVE DEVICES. There are any number of these, some built in by a manufacturer of equipment incorporating radioisotopes, some added on by the user-company. Lead shields, audible alarms, sealed sources, roped-off areas, handling tongs, are just a few of the methods used to prevent contact with radiation.

CUMULATIVE EFFECT INDICATORS. To make certain that the cumulative effect of radiation never gets beyond recommended levels, you can use radiation badges or pocket ionization chambers. The AEC does not require these in all installations. However, it does recommend them, in some types of radioisotope installations.

The badges are affected by the total amount of radiation they receive over a period of time. Worn on an employee's shirt, they'll indicate just how much radiation he has received. You don't measure the amount of radiation on the badge. Your badge supplier does that. He also gives you fresh replacement badges regularly. Complete service costs about 60¢ per badge per week.

Pocket ionization chambers look like a pen and clip onto an employee's pocket. When you want to measure total radiation that has struck them, you insert them (cost: about $25) into another device (cost: about $200) which tells you.

RADIATION SAFETY EDUCATION. Radiation safety programs, as practiced by most plants today, are nothing more than informal attempts to assure employees that they're adequately protected against the dangers of excessive radiation. Sometimes plants will show a movie, give a lecture, or assign reading to key people. That's part of the briefing you'll probably want to give.

But don't let anyone tell you you'll have to make a career out of it. FACTORY's survey proves you don't.

Turn the page

What Do You Tell Employees?

Here are some of the things you might tell employees. They're so basic to satisfying the employee's curiosity that you'd profit by getting them across right away. They're partly from FACTORY's survey, partly from information supplied by the Atomic Energy Commission.

1. Describe how people are working with far higher levels of radiation with complete safety. You can cite, for instance, the safety record of the Atomic Energy Commission plants. It has been better than the safety record of the chemical industry as a whole. During the entire period of AEC operation there have been only two deaths due to accidents involving radiation. And these were accidents on atom-bomb experimentation, not on radioisotope or radioactivity handling.

2. Show how you're protecting against radiation. It's probably the most important single thing you can do to allay employee fears.

Employees will be interested in safety devices—what they can do, how they work. Be as brief as you like, but describe your protective devices, radiation survey equipment, badges, ionization chambers, etc. They're just as important to you in gaining employee confidence as they are in the actual protective work they do. So why not get the most out of them?

3. Tell how the Atomic Energy Commission has checked your installation and found no undue safety hazard. It's always wise to give some official endorsement to your plant safety program.

In four and a half years of isotope distribution under AEC, **no case has been noted of injury** to a person using or handling radioisotopes.

4. Give employees analogies between radiation and other dangers common in the plant. High-voltage current and acids used in heat treating are really far more dangerous. Let your workers know it. Where employees fear "unseen dangers," you can make the analogy between radiation and bacteria: Take the necessary precautions and you're safe.

5. Eliminate exaggerated fears of sterility right away. You need an extremely large dose of radiation—almost enough to kill you—to be made sterile. And you're not going to get it working with radioisotopes. Your safety precautions are sufficient to insure that many, many times over.

What If an Employee Shows Abnormal Fear?

This will not be a big problem. But it may arise, and it's always good to be ready. The thing to do is spend a little more time with him. Do it on a strictly personal basis, so he will not be reluctant to tell you about his fears. If you don't know exactly what's troubling him, you'll never be able to convince him he has nothing to worry about.

Are Employee Medical Exams Necessary?

By all means, subject all employees working with radioactivity to periodic medical examinations. And be sure to give them a complete exam—including blood count and urinalysis—before beginning work with radioactive materials. There are two good reasons:

- Periodic exams will convince employees that their work is not harming them.
- Employees won't be able to blame any lapse in good health on their working with radioisotopes. You'll have your medical records as proof.

...the Training Problem

Do You Need an Employee Training Program?

If you do, you'll probably want to use one or more of the following methods now in common practice.

- **Sponsor lectures.** You may be able to get AEC people to come to your plant for talks. Also, you can have various staff people, your consultant, or your isotope supplier make an informal talk before the people directly concerned with radioisotopes.
- **Show films.** There are several good films on radioisotopes available from both the AEC and private organizations. (See list on page 324.)
- **Encourage reading of books and pamphlets.** It will pay you to try to acquaint your employees with further information on the job. Keeping a "help-yourself" bookshelf of material on radiation will both give your employees confidence and help them learn their jobs better.

How Do You Get the Know-How You Need?

Maybe you don't have a single employee who's ever even heard of radioisotopes. That's still no reason why you can't use radiation profitably without adding a trained specialist to the staff.

There are lots of good ways to get the know-how you'll need into your plant:

1. **Ask a consultant.** This is probably your best bet. He'll analyze your problem, tell you just what you need in the way of equipment, and show your employees how to get the most out of it, with complete safety.

2. **Check with the radiation equipment suppliers.** If you're using beta gages or radiography, makers of the equipment will come into your plant to show employees how to use it. In many cases a supplier will have a detailed manual covering operation and maintenance. The supplier will also arrange to service your equipment regularly, if needed.

Finally, at least one manufacturer of radiation equipment (Tracerlab, Inc.) teaches your employees how to use its equipment properly. Courses run from one to two weeks. They're given on the East Coast in Boston; on the West Coast, in Berkeley, Calif. Cost: About $500 for one person.

3. **Ask AEC.** It will suggest Atomic Energy Commission literature, or help you in any other way it can.

Also, AEC has an isotope training course that may help plant people with a good physics or research background. This "college of nuclear knowledge," known as Oak Ridge Institute of Nuclear Studies (ORINS, for short) runs in 4-week sessions at Oak Ridge, Tenn. There's a $25 fee. Once graduated, an employee could act as your own plant consultant on radioisotope matters.

4. **Assign an employee to study the field as a regular part-time duty.** Through his periodic reports, management and the entire technical staff can be kept up to date.

5. **Consult your state department of health.** It can be very valuable in answering questions on health and safety.

. . . the Production Problem

NOT THIS COMPLICATED kind of radioactive materials handling for you. They do it this way at Oak Ridge, other AEC plants.

BUT THIS SIMPLE kind of handling will be common in industrial plants. Employee holds "hot" material at end of tongs.

How About Radioactive Materials Handling?

Those pictures you see of Oak Ridge and other "hot spots" where large quantities of radioactive materials are being handled do not apply to you. You'll need no intricate remote controls to manipulate the radioisotopes with safety.

But carrying radioisotopes from place to place in the plant does require certain precautions. Getting too close to unshielded sources can result in injury. Bodily contact with radioisotopes also can harm you.

Here are three easy, inexpensive ways to get around this hazard:

1. **Store radioactive materials in lead containers.** A box shielded on all sides by a specified thickness of lead will stop the radiation. It's also a *must* to label the box prominently with "Danger —Radiation—KEEP AWAY." Specify the contents on the tag.

2. **Use rubber gloves and long-handled tongs to carry the materials.** Tong length will depend on the quantity and type of radiation emitted.

3. **Use automatic control devices.** This would be especially desirable where radioisotopes must be added periodically to a process. In this way people need not come in contact with them

Which Isotope for What?

First thing to remember is that each isotope is different—has its own personality, so to speak. There are three big considerations in selection.

Type. Some isotopes give off radiation that is very powerful and penetrating. The rays can go

through many inches of metal. Others are weak, can be stopped by the thinnest sheet of paper.

If you're interested in deep penetration—as you are for radiographing thick castings—you'll want a powerful gamma emitter. If you want the rays to be absorbed as quickly as possible or to bounce back from the material—as in thickness gages—you want beta-emitting isotopes.

Strength. In addition to type, you want to know how much of an isotope you need to do a job. Isotope strength is measured in curies. For tracer and industrial instrument work, amounts up to 10-thousandths of a curie are common. For radiography work, half a curie or more is used.

Length of life. Radioactive materials are in a constant state of disintegration. They have useful lives ranging from a fraction of a second to thousands of years. (The time it takes a radioisotope to lose half its strength is called its half-life, a term indicating length of life for each isotope.)

Your beta gage and radiography source are examples of applications where long-life isotopes are desired. You don't want to replace them often.

Short-life isotopes are useful where you want the radiation in a material to wear off fast so it won't contaminate your product or plant equipment—like spotting pipeline leaks.

SOME COMMON RADIOISOTOPES

Isotope	Useful Life	Useful Radiation	Application
Antimony 124	60 days	Gamma-mixed energies	Tracing and process control
Iridium 192	70 days	Low-energy gamma	General-purpose industrial radiography. Used in corrosion gage.
Sodium 24	14.8 hrs.	Very penetrating gamma	Radiography of very thick sections. Tracer work where very rapid decay is needed.
Strontium 90	25 years	High-energy beta	Heavy sheet thickness gages.
Cobalt 60	5.3 years	Penetrating gamma	Radiography of thicker sections.
Thallium 204	2.7 years	Medium-energy beta	Thin sheet thickness gages.

Quick Answers to Seven Key Questions

1. Are Radioisotopes Expensive?

No—for the same reason that radioisotopes are not necessarily dangerous: A little goes a long, long way. Cost of an 800-millicurie source of cobalt 60 is about $50. It will cost you about $150 more to have it enclosed in a capsule, $10 more for handling charges, and an additional charge for shipping. Or you can rent it from your supplier, in many cases.

Other isotopes, in useful quantities for plant applications, may cost a lot less or a little more than the cobalt 60. AEC distributors regularly publish radioisotope price lists to keep you up to date on costs.

2. Do You Need Tight Plant Security?

There's no more security trouble in using radioisotopes than there is in using electricity. Your employees don't have to be cleared by the FBI. You are in no way involved with the atomic energy program. Of course, you can keep your original development work company-confidential if you like. The Atomic Energy Commission will give you complete cooperation on this score.

3. Is Your Product Made Radioactive?

No danger at all where you're merely exposing your product to radiation from an outside source. That's the case with the beta gage, radiography, and other applications where the radioactive material is not a part and cannot become a part of your finished product.

Where isotopes travel freely about so that they may be present in your product, they will continue to emit potentially dangerous radioactivity.

You can do one of two things to get rid of the danger:

1. Remove the radioactive material. This can be done by mechanical means, such as filtration or precipitation, or by chemical removal. If you have radioactive iron present in solution, for instance, you can filter the iron. You're also filtering the radioactivity. And the danger.

2. Let the radioactivity wear off. This will be the case if you use a short-lived isotope. Just let your radioactivity "die out" until there's nothing left by the time the product is sold. Let it sit in the warehouse until it's safe. To make sure there's no radioactivity clinging to your plant equipment, you can flush pipes, tanks, and coils with water until a radiation survey meter shows no radiation.

4. Will the Public Object?

Some companies that use beta gages or radiography are turning their use of radioactive materials into a sales idea. They're telling in advertising how "atomic energy" is helping produce a better product. The public, in fact, is ready to hear how your company, also, is keeping pace with the atomic age.

5. How Do You Get Radioisotopes?

Probably the supplier of your equipment or the consultant who sets up your installation will do most of the paperwork for you. But even if they don't, here's all you have to do:

1. Fill out a copy (with three carbons) of AEC Form No. 313, called "Application for Radioisotope Procurement." AEC will furnish you with copies of the form and instructions on how to fill it out.

2. You mail three copies of the completed form to AEC and keep one for your files.

3. After review and approval of your application, AEC will send you Form No. 374, called "Authorization of Radioisotope Procurement."

4. Send the original of these forms to your isotope supplier. He'll see that your order is filled.

What kind of information are you required to supply in the first form (No. 313)? Here's what you have to list:

1. Name the person who will have supervision over the source, indicating his experience with X-ray, radioisotopes, or radium. If he has no such experience, state his general technical or professional background.

2. Describe the technique used in handling the source, and the use of personnel monitoring instruments.

3. List all miscellaneous equipment for health protection.

AEC does *not* make a personal check of each plant. It determines your ability to handle the radioisotopes safely and effectively from your application. But it may visit your installation at any time for general inspection.

6. How Do You Get Rid of Radioisotopes?

Radioisotopes emit possibly harmful radiation even after they're no longer usable. So how do you dispose of them safely?

In cases where you rent the radioactive source from a supplier, he's responsible for disposal.

Where you are responsible for the source, your consultant will, no doubt, handle disposal.

Where neither supplier nor consultant can do the job, contact AEC. It will tell you if you can dispose of it yourself and how to do it. Or it may ask you to send it to AEC for disposal.

There is one angle, though, that you might watch for. If the radioisotopes that you use in processing can become mixed in with your plant wastes or effluent, you should make sure there is no hazard to streams or public facilities.

7. How Do You Get Started?

Suppose you've decided radioisotopes might be the answer to a plant problem. Then the first thing to do is to contact AEC.

The AEC people will indicate what literature might be helpful. There are also booklets available that list all industrial users of radioisotopes, all producers of radiation instruments, all isotopes, etc.

AEC will refer you to a consultant. In some cases, that consultant may, in turn, refer you to another.

Sometimes yours will be a one-shot problem, like locating leaks in buried plumbing. In such cases, you can farm out the entire job—start to finish—to a consultant. You just have to pay for his time.

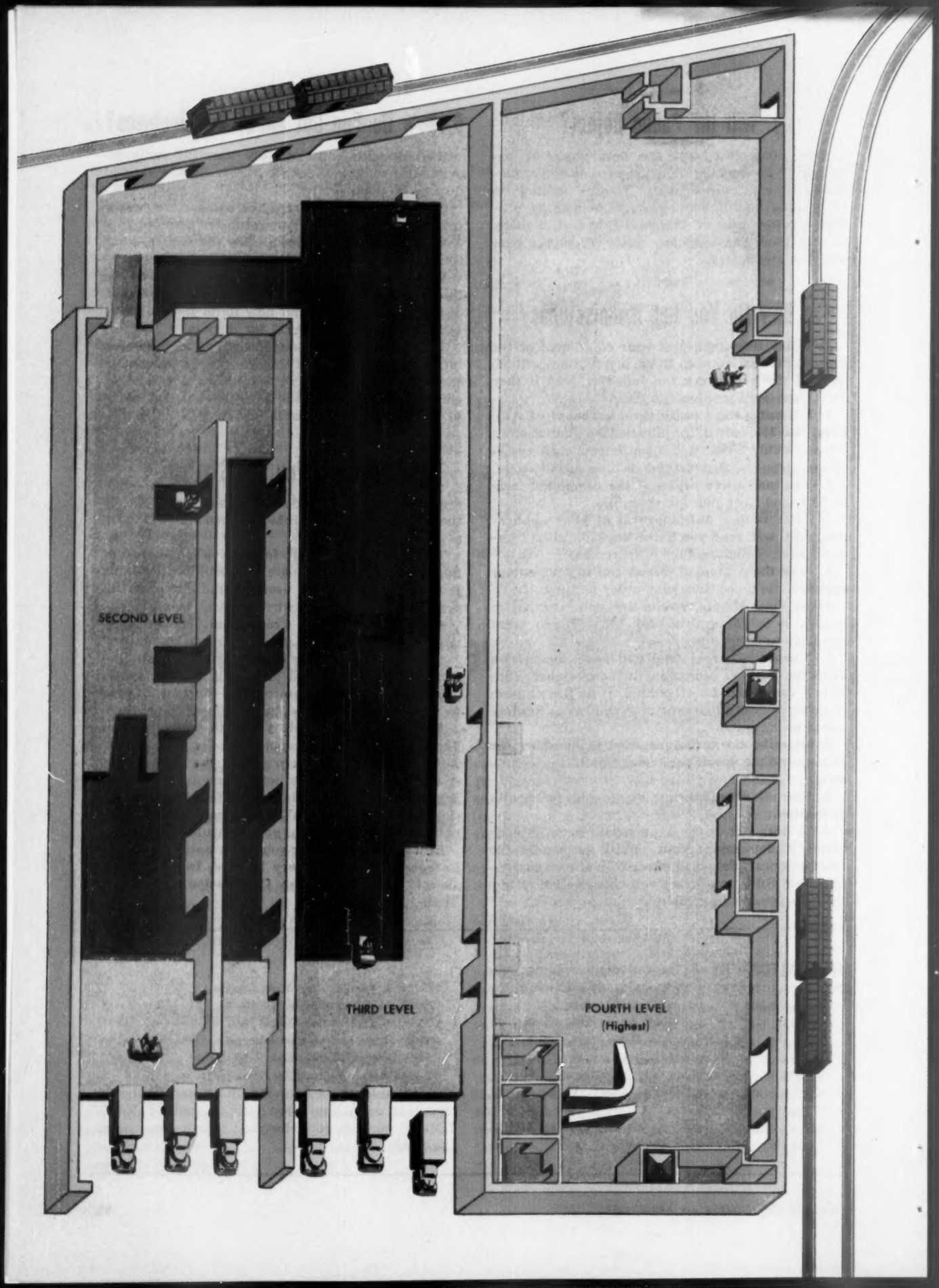
AEC will actually help you with your problem. The agency does not compete with the private consultants. But it will help you if the information or advice you require is not too involved and if it deals primarily with health, safety, and radioisotope procurement. AEC help comes free. Why not use it before calling your consultant?

Best place to write for your information on radioisotopes is **Field Advisory Service, Isotopes Division, U. S. Atomic Energy Commission, Oak Ridge, Tenn.**

ACKNOWLEDGMENT • The following organizations made important contributions to this article:

Isotope Products, Ltd., Box 127, Oakville, Ontario
Tracerlab, Inc., 130 High St., Boston 10, Mass.
Nuclear Development Associates, White Plains, N. Y.
The Atomic Center, 489 Fifth Ave., New York 17.
U. S. Testing Co., 1445 Park Ave., Hoboken, N. J.
NUCLEONICS, a McGraw-Hill publication, 330 W. 42nd St., New York 36.
Industrial Nucleonics Corp., 1205 Chesapeake Ave., Columbus 12, Ohio
Schutte & Koerting Co., Bucks Co., Pa.
Carborundum Co., Niagara Falls, N. Y.
U. S. Atomic Energy Commission: New York Operations Office, New York; Technological Information Office, Washington 25; Isotopes Division, Oak Ridge, Tenn.
Sylvania Electric Products, Inc., Bayside, N. Y.

Our thanks to each of the above and to the 80 unnamed companies that participated in FACTORY's survey of industrial radioisotope users (page 88).


SECOND LEVEL
THIRD LEVEL
FOURTH LEVEL
(Highest)

Mechanized handling...

Makes Old Warehouse Good As New

By A. T. GAUDREAU • Partner,
Gaudreau, Rimbach & Associates, Pittsburgh

WHEN A MAN is thoroughly "sold" on the advantages of mechanized handling, he can usually find 1700 reasons why a new warehouse is desirable.

Case in point is the forty-year-old "new" warehouse of the Morris Paper Company, Pittsburgh. There were "reasons" galore why a new *structure* was needed if Morris was to get the advantages of mechanized handling. Here are a couple of them that would have been enough to "carry the day" with any executive who was not being especially careful to avoid jumping to conclusions:

1. The warehouse comprised three adjacent buildings with three different first-floor levels. Maximum difference in levels was 43 inches. That made continuous on-the-ground movement through the three buildings impossible. And the nature of the warehousing operation, plus the tremendous diversity of products—from 12-ft. rigid rolls of floor covering to small cartons of fragile toys, would have made extensive overhead conveyors awkward.

2. The space between two of the long structural walls in one of the buildings was only 19 feet wide. In that width, you couldn't put in an aisle with any room to maneuver and still leave enough storage space to be worth talking about.

Impressive arguments? Sure. But Morris Balter, the company president, wasn't quite ready to accept them as conclusive.

So another approach was tried. It was based on this simple premise:

As a materials handling device, the powered high-lift fork truck serves not one but two basic functions—to move or transport materials *and to lift*. (It's strange—and unfortunate—that a lot of people think of this lifting function exclusively in terms of its more limited application of stacking.)

The "Multi-Level" Problem

Recognition of this "lift" function meant it was possible to use the high-lift fork trucks to overcome differences in floor level. Lift trucks operating on the low level deposit their pallet- or skid-loads on the dock, to be picked up by trucks operating on the higher level.

At the Morris warehouse, volume justifies "permanent allocation" of trucks to the different levels. With smaller volume, a single truck used part-time on each level could get the same results. You'd have to do some scheduling, but the lower volume would simplify this.

When you look at the cut-away diagram of the warehouse (on the opposite page), it may seem that there are so many different levels and so many ramps as to interfere with free movement. This is not so. Except for the ramp from the rail dock down into the pit (upper left in diagram), all other ramps have such small slopes as to be virtually unnoticeable to the fork lift truck drivers, so they present no problem.

The operation is really carried on at only two levels—the so-called pit, and the main level. The main level has, in effect, been extended by a U-shaped platform which surrounds the pit. While there are variations in elevation within the pit, and also on the main level, these variations do not obstruct free passage throughout each of the areas.

The "Solid-Wall" Problem

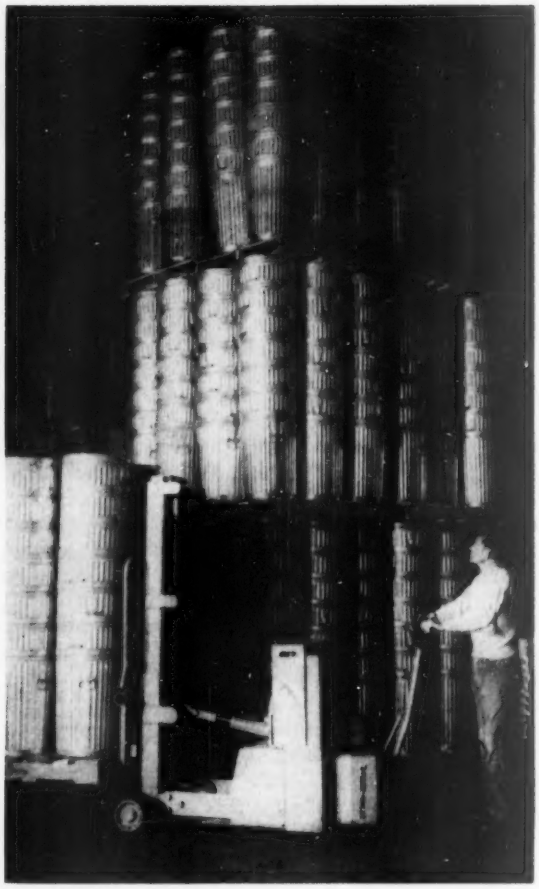
The two parallel walls only 19 feet apart called for some "rethinking," too. So you can't put an aisle between them. Well, there's nothing particularly sacred about walls. Holes have been knocked through walls before. Why not a series of transverse aisles? A survey showed that in this part of the three-building unit a continuous wall was not needed for structural support.

The solution was to cut four passages through each of the walls. This not only permitted efficient utilization of the space between them, but resulted in freer movement throughout the pit area than would otherwise have been possible.

Turn the page

Main operating levels are indicated by shadings of black and gray in this artist's sketch of "first floor" in Morris Paper Warehouse. Ramps are seldom used, since fork lift trucks transfer pallets or liftable floor trucks from "pit" to elevated U-shaped platform. There, other trucks pick up the load for dispatch or restoring. Maximum difference in elevation between adjacent levels is 43 inches. Trucks are "permanently" assigned to each level, but can be shifted by ramps when workload requires.

LONG PLATFORM beside pit provides easy access to balcony storage located 9 feet above lowest level. Small loads can be lifted to platform through opening where man stands on pit floor.



TOP FLOOR of warehouse is used for light, bulky, or slow-moving items. The "walkie" fork-lifts take advantage of 21-ft. ceiling, but stay within floor loading limit of 250 lb. per sq. ft.

Balcony Storage a Bonus

The elevated truck aisle running the long side of the pit provided a bonus in the form of balcony storage. It's a bonus because it was not anticipated in the original modernization plans.

The runway permits the use of elevated storage racks and bins based 9 feet above the level of the pit floor.

It is in this section of the pit that the long rolls of floor coverings are stored in upright position in vertical stalls. The balcony racks are directly above these stalls, are 9 feet high, and extend 15 feet back over the pit.

Much of this storage space would have been lost, had the level of the pit been raised to the level of the docks at either end of the building.

There were other reasons for rejecting that proposal too—among them the fact that it would have added about $35,000 to the cost of the modernization program.

Storage on Upper Floors

Two of the buildings in the warehouse were single-story structures. But the "main" building (at right on the diagram, page 96) consists of three stories. Getting 100% utilization of the upper-story space was fairly simple because of the great variety of products being warehoused.

It was merely a matter of recognizing the respective ceiling heights and permissible floor loads—12 feet, 500 lb. per sq. ft., on the second floor; 21 feet, 250 lb. per sq. ft., on the third—and then scheduling the storage accordingly.

The second floor was given over to the storage of merchandise normally kept in bins, such as small items of paper stock, janitor supplies, electric wares, and toys. All package-wrapping operations incidental to the sale of these items were also placed on this floor.

For fast movement of small packages to and from the second floor, an inclined power belt con-

PLATFORM-TO-PIT transfer (top photograph) overcomes problems of different levels. Truck at rear moves pallet load from car on siding to platform edge for pick-up by pit truck.

OUTBOUND ORDERS for road trucks (bottom photograph) are pre-assembled on pallets. The special storage racks in the background hold pallets until an "economic" truckload is on hand.

veyor and companion spiral gravity chute were installed near the truck shipping dock.

To capitalize on the high ceiling of the top floor, it is given over to storage of all palletizable merchandise that is of a light, bulky, or slow-moving nature.

Material movement to and from the third floor is by means of elevator. (The elevator also serves the second floor on the rare occasions when the conveyor and chute are inadequate.)

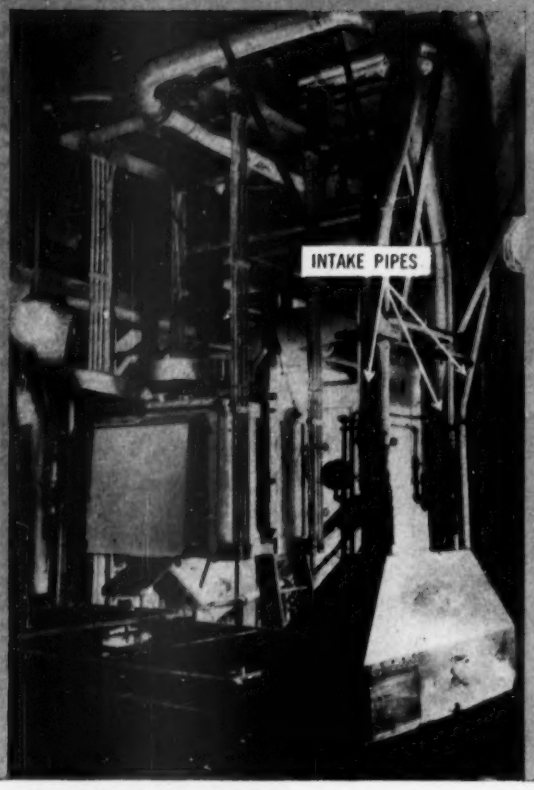
Of course, the limited loads permitted on the second and third floors made it impossible to use the rider-type high-lift trucks adopted as standard for the first-floor operations. So powered "walkies" were chosen for the upper floors.

While lift trucks of this type are somewhat more limited than the rider-type in terms of payload, they could handle anything up to the floor-loading limit. And they presented no problem when it came to stacking to the full ceiling height of 21 feet on the third floor.

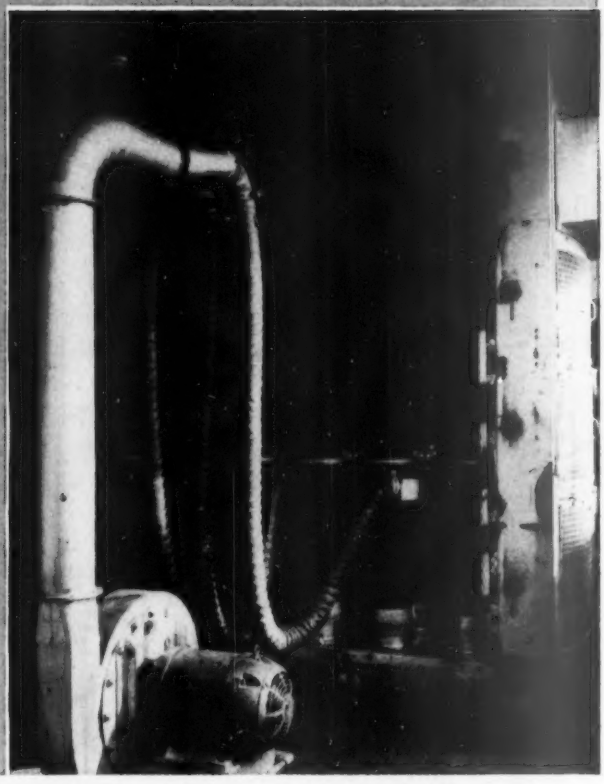
Additional Handling Equipment

To round out its handling equipment on the first floor, Morris supplements the high-lift fork trucks with liftable floor trucks and semi-live skids, as well as standard pallets. Long and awkward pieces can be laid down on the liftable floor trucks, and raised or lowered by fork trucks as needed.

The final pay-off comes in the way this combination of equipment is used for order selection and shipping. Even where an order consists of cartons, cases, bundles, or rolls, by one's and two's of an item, the order is pre-assembled as a pallet load. All pallet loads scheduled to go out on a particular truck are then moved to temporary storage in the special racks on the truck dock. When the road truck is ready to go, it's only a few minutes' job for the fork trucks to transfer the pallet loads from the rack to the tail gate. The arrangement cuts down on hand-loading labor and eliminates confusion; it also reduces drivers' waiting time.



DUST HOOD AND INTAKE PIPES at starch-molding machine in E. J. Brach & Sons plant carry starch-laden air to . . .



. . . **FILTER TUBES,** where starch drops out. Blower (foreground) activates air rings that dislodge starch from walls of tubes.

Dust was an explosion hazard. But now this...

Plant Clears the Air With

DUST IS NEVER DESIRABLE. It's always something of a problem. It may even be dangerous—as at E. J. Brach & Sons, Chicago.

Brach's special headache was not "dirt" dust, but fine cornstarch dust generated by the starch-molding machines used in making candy. It was an explosion hazard and hindered efforts to maintain pleasant working conditions.

Brach wanted to return starch dust to process after filtering. But storing and dispersing it periodically was not enough. What was needed was a continuous method of removing starch from the collector and delivering it in bulk to storage.

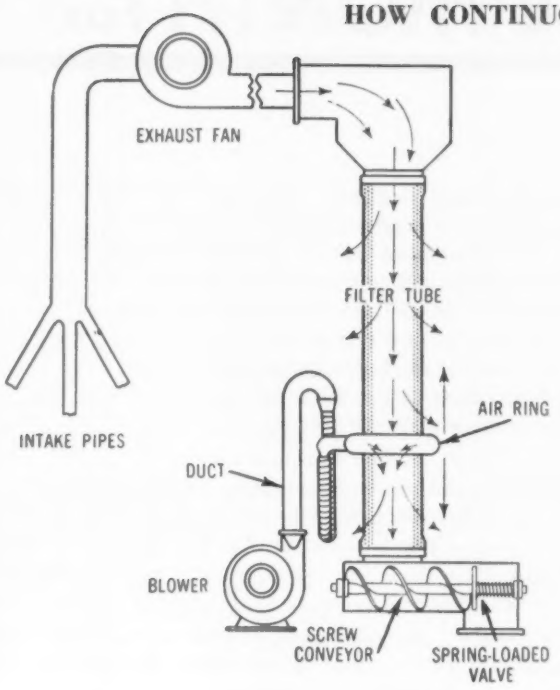
That's why five Hersey-type filters, installed in 1949, solved the problem. They work continuously —sucking up starch-laden air at the molding machines, filtering out the starch, and returning it to process. Each unit is housed in a separate room and has 24 wool-felt filter tubes arranged in rows of six. Each row has an exhaust fan and a screw conveyor to move the dust to storage bins.

The Brach people say their Hersey-type units offer big advantages—not only if you want to recover the dust, but also if your sole aim is to get rid of it.

ECONOMY · Dust doesn't build up in the filters, so there's no build-up of back pressure. This holds down operating costs by minimizing horsepower requirements of the exhaust fans that pull the air into the filtering system and the blowers that dislodge the dust from the walls of the filter tubes.

Brach saves on labor costs, too, because so far its system has been completely self-cleaning.

HOW CONTINUOUS FILTERING WORKS



Each exhaust fan sucks starch-laden air from hood on starch-molding machine through intake pipes to six filter tubes. Air enters tubes at a pressure of about 4 inches of water, filters out through wool-felt walls, leaving starch deposits clinging to inside.

These starch deposits are dislodged continuously by action of moving air-jet ring around each filter tube. Air from a blower is forced out through a narrow slot on the inside of each ring at two or three times the pressure inside the filter tube. Ring makes one up-and-down cycle a minute. Starch settles to screw conveyor at bottom of tube.

As starch piles up at end of conveyor, it forces open a spring-loaded valve, falls into duct, and is returned to process.

Automatic Continuous Filtering

EASY MAINTENANCE • Replacing a filter tube takes less than an hour. Tubes can be replaced one at a time, without removing other tubes in the unit. The tube is simply unclamped and removed, and another is clamped in its place.

Only the row in which the tube is located is shut down — three-quarters of the unit still functions.

All in all, maintenance has posed few problems. Only two of these were at all serious:

1. Cemented seams of the felt tubes parted under prolonged exposure to high temperatures (some of the air to be filtered comes from driers at about 170F.) Sewed seams solved this one.

2. Flexible hoses carrying air from blowers to the air rings that clean the tubes wear out every year. That is not unreasonable, we think, because of the constant flexing.

SAFETY • Brach's filtering process almost rules out any chance of fire or explosion. Even if trouble were to occur, it couldn't spread through the whole system. Here's why:

- Continuous dust removal allows only a small amount of the air-starch mixture to be present in the system at any one time.
- Each filtering unit of 24 tubes is isolated from the rest of the filtering system by being located in a separate room.
- Each row of six tubes is separated from the rest of its unit by its own exhaust fan on the intake side, its own discharge conveyor on the discharge side.

At the end of the conveyor, a spring-loaded valve opens only when dust is forced through mechanically, thus isolating the starch in the tubes from the starch in storage.

IDEAS OF THE MONTH *for*

By LEWIS K. URQUHART • Managing Editor

EXTRA! EXTRA! NEW CONVEYOR BELT, appropriately called "Griptop," has been developed by The B. F. Goodrich Co., Akron. It moves packages and cartons up and down grades as steep as 55 degrees. Secret lies in parallel ridges that run across the belt. They stand ¼-inch high and are cross-cut to form 5700 tiny gripping blocks of rubber every square foot. Belt is self-cleaning. As it travels around the pulley, the rubber blocks fan out and release dirt that may be lodged in the grooves. Space savings are spectacular. An installation designed to operate at 45 degrees requires 42% less floor space than one that operates at 30 degrees, which also means the conveyor will be shorter by 29%.

BOOKLET OF THE MONTH is a diesel engine primer written in simple, non-technical language. Dozens of illustrations. For a free copy, address P & H Diesel Div., Harnischfeger Corp., Crystal Lake, Ill. Ask for "What You Should Know About Diesel Engines."

CRAVE QUIET? Then you'll go for Quiette. It's a truly quiet mechanical light switch that can be (1) installed in *any* position, not just up and down, (2) used with both incandescent and fluorescent lights. The Arrow-Hart & Hegeman Electric Co., Hartford 6, Conn.

ELIMINATE THAT SEPARATE PRINTING OPERATION by installing a machine that prints trade marks, code numbers, all-over decorative designs, etc., as part of the processing. The Gottschoprinter, made by Adolph Gottscho, Inc., Hillside 5, N. J., prints on paper, metal, linoleum, cloth, plastics, laminations, and similar hard-to-print materials varying in thickness from 0.001 to 1.0 inch, and as wide as 72 inches.

HOW TO PACK IT is one of today's more troublesome problems. It's also the name of a newly revised gold mine of packaging ideas. Get your copy—free—from The Hinde & Dauch Paper Co., Sandusky, Ohio.

WHICH REMINDS US OF CLIP-A-TAPE, a new pushbutton-operated tape dispenser made by Ideal Stencil Machine Co., 103 Iowa Ave., Belleville, Ill. Set it for any length you like, from 3 to 100 inches, and—at a touch of a button — it delivers instantly. Tape is *never* too wet, never too dry. And a thermostatically controlled heating unit keeps water warmed to the best temperature for correct sealing.

ZEPREX is an amazing (we think) mineral building material perfected in Sweden. Comes 20 inches wide in lengths up to 18 feet and in thicknesses varying from 2 to 10 inches. It's strong, yet weighs only one-fifth as much as concrete. It can be cut with a saw or bored with a brace and bit. It's fireproof, possesses excellent heat insulating properties, has less than one-third the water absorption of regular building bricks. More about it in "New Materials" for May. Meanwhile, for more information write U. S. Plywood Corp., 55 W. 44th Street, New York 36.

Factory Executives

LEG LOTION—the kind that subbed for stockings during the nylon shortage of some years back—is now being issued to workers at Spear Carbon Co., Saint Marys, Pa. It seals the pores of their faces so that airborne particles of carbon and pitch can't clog them. Seems sun and wind acting on carbon in skin pores causes irritation. Lotion can be washed off in a jiffy at quitting time.

POWDERED METALS are finding new industrial applications every day. Newest on the market appears to be "Steel Oilite," which is said to have several times the ductility of previous metal powder products. And it has physical properties comparable to mild carbon steel, such as SAE 1010, 1020, or 1030. An inquiry addressed to A. J. Langhammer, president of Chrysler Corp.'s Amplex Division, will bring you complete details.

AIRTUBE is what Lamson Corp., Syracuse, calls its fully automatic pneumatic tube system—the quickest way we know of transporting messages, punch cards, small tools, lab samples, etc., from one point to any other. No central control. Just set the adjustable rings on the carrier and it'll go places.

KNOW YOUR CARBURETOR is a booklet you can get free from Pennsylvania Refining Co., 2686 Lisbon Road, Cleveland 4. Tells you in non-technical language about troubles usually encountered—and how to correct them.

PALLET USERS—and non-users, too—will want to know more about those new, all-wood, collapsible pallet spacers. Idea is to prevent compression damage by dividing load into four equal-sized compartments. East of Rockies, write to J. R. Perkins Lumber Co., Fullerton Bldg., St. Louis 1; west of Rockies, Hamerslag Equipment Co., 43 Elmira St., San Francisco 24.

SAFESTAT is the best grounder we've seen for equipment in areas where explosion hazards exist. Maker is Walter G. Legge Co., Inc., 101 Park Ave., New York 17. Contact with conductive floor is made by a 7x7-in. metal plate. A 2-lb. tension weight, in a canted position, maintains a constant pull on a chain attached to operating equipment.

YOU BUTTON METAL TO METAL with the "Metalacing" method just announced by Crockatt Engineering Co., San Francisco, which says it's a *revolutionary* one-step method of fastening sheetmetal—and may be right. No rivets, bolts, welds, or solder. Just a special punch and die that can be inserted in an ordinary punch press. Crockatt also says it will work with any material that can be sheared, drawn, and upset.

UNIT FIRST AID KITS designed for one-time use are fine for companies with scattered operations. No half-empty bottles and half-used rolls of gauze. So the kits remain sanitary during periods of infrequent use. Data sheet D-202 (National Safety Council, 425 N. Michigan Ave., Chicago 11) tells how to make 'em up. It'll cost you 17¢.

10 steps to...

GRINDING WHEEL SAFETY

The manufacturer builds a wide safety margin into every grinding wheel he turns out. But he can't build into his wheels the judgment and skill that will prevent misuse or mishandling. That has to come at the point of use in the plant. And that's where these 10 check-points come into the picture. Use them as a guide to safer operation in *your* plant.

1 Inspection

Good grinding wheel safety practice starts with careful unpacking of the wheel. First, examine the shipping container for evidence of rough handling which may have damaged the wheel inside. Then carefully inspect the wheel itself for visible cracks or other damage.

This is a good time to make the "ring test" by tapping the wheel with a non-metallic object (see photo). The grade of the wheel determines the pitch of its sound when tapped. It is in good condition if tapping causes a clear ring, even though the pitch may be low. A dead sound is a warning signal. Tapping a vitrified or silicate-bonded wheel produces a clear, metallic ring, while organic or resinoid-bonded wheels yield a less distinct sound.

Oil or water in the wheel makes the ring less clear. And in wheels where the manufacturer has added calculated amounts of resin or grease to modify cutting action, the sound will be muffled considerably.

2 Handling of Wheels

Constant, intelligent care should be exercised in handling wheels to prevent dropping or bumping—*especially in using portable grinders.* A grinding wheel should never be rolled on the floor. If quantities of wheels are being moved, use a hand truck, or call a power truck. Move loaded vehicle carefully to avoid bouncing or bumping grinding wheels. When transporting straight wheels larger than 6-in. diameter, it is all right to lay them flat on corrugated separators. But in the storeroom they should be placed vertically in individual compartments. Straight wheels under 6-in. diameter should be stored flat on corrugated separators.

3 Mounting

Conduct the "ring test" just before mounting. This is a *must!* Then check to see that the machine speed is not greater than the maximum operating speed printed on the wheel blotter or tag. Safe wheel use requires properly adjusted spindle bearings, proper flanges, blotters or other compressible washers, and adequate, but not excessive, tightening of spindle end nuts. *(Tightening too much may cause trouble. Watch out for it!)*

Operators should be impressed with the fact that grinding wheels are relatively fragile and can be broken by stresses induced by excessive tightening forces or rough handling. A torsion wrench permits the operator to limit the tightening force to a predetermined safe value. To the user of grinding wheels, these wrenches are an excellent safety investment worth many times the cost.

4 Guards

Possibly the number one rule of all safety practice in grinding is *use the guards or hoods at all times.* Too often, operators become impatient with the slight inconvenience, often imaginary, that the guards cause, and remove them. Plant managers can well make this a cause for "time off," because the operator is exposing not only himself, but also others working nearby, to an unnecessary hazard. The rule cannot be emphasized too strongly:

"Never operate a grinding machine without the wheel guard firmly in place."

This is especially true of portable grinders. The chief advantage of these machines—mobility—becomes a very real source of danger in plants where safety rules are not observed. Without a proper guard to protect it, the wheel on a portable grinder that is accidentally knocked off the workbench is likely to crack and subsequently fly apart when the operator resumes work. Avoid this kind of trouble by providing a V-shaped wooden trough under the workbench for holding the portable grinder when not actually grinding.

Without a guard a portable grinder, in the hands of a careless operator who lays it down before the wheel stops rotating, will jump or travel along the floor, easily leading to cracks or wheel breakage.

5 Operator Instruction

A new worker should not be allowed to operate a grinding machine until he has been thoroughly instructed in its proper operation by a competent teacher. He should be taught always to wear safety glasses or goggles to protect his eyes, as well as protective clothing—gloves, shoes, aprons, etc.

All operators should be encouraged to seek instruction before operating unfamiliar machines. All workers—including plant maintenance men—should be cautioned never to improvise accessories for grinding machines. This is in the province of the plant engineer, who understands the design of accessories.

Here a foreman at Royal Metal Manufacturing Company, Michigan City, Ind., makers of metal furniture, is instructing a new grinding machine operator.

Turn the page

Begins on page 104

6 Start New Work Right

The operating limits of both wheel and machine should be carefully considered before the wheel is mounted. It is important to use a grinding wheel correctly. Instead of grinding on the flat sides of a straight wheel, use either a back-plate type wheel or a cylinder. The proper grinding face of a straight wheel is its peripheral surface. Be sure you're using the proper coolant. After turning on the grinding machine, give the newly mounted wheel a "run-in" test for at least 60 seconds as the foreman and worker are doing in this picture.

Be sure no one stands in front of the wheel; if it is broken and cracks during the "run-in" test, the pieces are likely to fly straight forward from the machine. After the grinding starts, see that the spindle is not overheating, since it can expand and damage the wheel. Be sure lubrication is adequate.

If a wheel *does* break (an unlikely occurrence if safety rules are followed) make a careful inspection of all circumstances immediately. Guards, flanges, spindle and other parts should be carefully examined before another wheel is mounted.

7 Right Speeds

Operate wheels at speeds no greater than those recommended by the manufacturer. *This is vital.* Unless impressed with the danger of wheel breakage involved, an operator may give in to an impulse to mount a grinding wheel on the handiest machine available, even though the machine's speed greatly exceeds the wheel's speed specification.

On the other hand, do not hesitate to operate a grinding wheel at its maximum rated speed when such operation is necessary to achieve most rapid stock removal. Careful factory testing has established this speed as being safe—provided the wheel has been carefully handled since its manufacture, and is thereafter correctly mounted and properly used.

Every grinding wheel manufactured by companies belonging to the Grinding Wheel Institute carries a maximum safe speed marking.

8 Use the Right Work Pressure

Here a foreman is cautioning a grinding machine operator not to press the work piece too hard against the wheel. Work should not be forced hard against a cold wheel. Apply pressure gradually to give the wheel a chance to warm up evenly from the grinding face inward. This is particularly true when starting work in cold rooms. It applies also to new wheels that have been stored in a cold place. The maximum pressure which should be exerted on a cold wheel is somewhat less than that resulting when a worker leans on the work piece.

If a heavy work piece is jammed hard against a wheel, there's a chance the force may spring the spindle or break the wheel. Too much pressure is being used if the sound made by the grinding machine begins to drop in pitch noticeably, a sign of slowing rpm., and the first evidence of stalling. In the case of cutoff wheels, excessive side pressure should be avoided.

9 Keep Wheels Trued, Dressed

The competent operator is not likely to forget to dress and true the wheel as often as necessary to maintain quality grinding production. But he should also be trained to adopt the habit of doing so occasionally for his own safety as well.

Wheel dressing, as shown here, is done to restore the wheel's grinding surface to its original clean condition, free from metal chips imbedded in the wheel face (loading). Truing is done to restore the sharp, straight, or special face on the wheel, and is necessary to assure accuracy in grinding.

Dressing assures better cutting action, and reduces the amount of heat generated, thus contributing to safer operation. The conventional dressing and truing tool (other than diamond) is equipped with a guard to protect the operator from flying particles. Only an approved dresser should be used. Truing contributes to safety by correcting out-of-round, and therefore out-of-balance, conditions.

The techniques of operating grinding wheels safely, including how to dress and true them, are described in an American Standards Association booklet (ASA B7.1-1947). To learn how to get a copy, see below.

10 Store Wheels Right

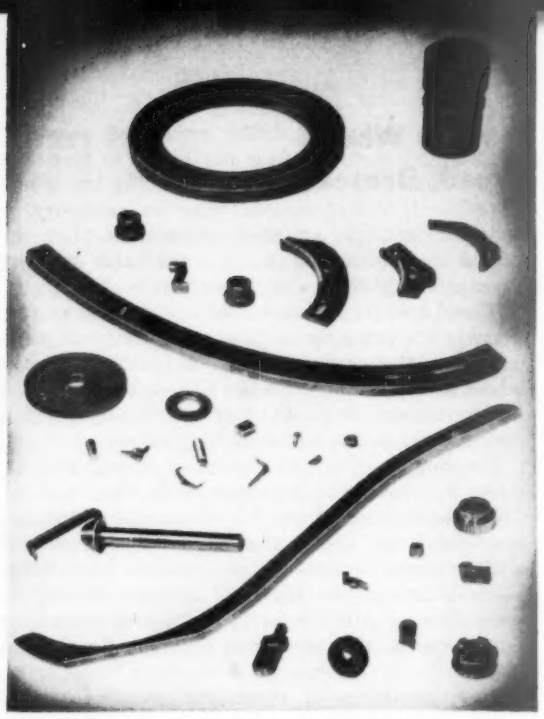
There is a recommended way to store each type and shape of grinding wheel so that it is fully protected until ready for use. Whether it be racks, bins, drawers, or shelves, the storage place should be free from dampness and not subject to extreme temperature changes. Storage racks should not be located where plant trucks can bump them and cause possible wheel damage. Proper storage facilities are not costly or difficult to construct. *(Illustration by courtesy of Carrier Corporation, Syracuse, N. Y.)*

Complete sketches and information on approved storage designs are given in *Handling, Storage, and Inspection of Grinding Wheels — Safe Rules and Methods* (Grinding Wheel Institute), and *American Standard Safety Code for the Use, Care, and Protection of Abrasive Wheels* (American Standards Association, ASA B7.1-1947). Both are available free by writing to the Grinding Wheel Institute, 2130 Keith Bldg., Cleveland 15.

We never play hunches.
We always let...

Facts and Figures Guide Our Purchase of New Equipment

By **ROBERT W. BLOSSER** • Supervisor, Industrial Engineering
Harris Division, Harris-Seybold Company, Cleveland



TYPICAL PARTS for Harris printing presses. Company wasn't satisfied with the way they were being heat treated.

THERE ARE TWO WAYS to make a decision on spending money for capital improvements. One—the easy way—is to rely on intuition. The other—and it's the hard way—is to let facts guide you.

Actually, we feel the hard way is less expensive because it minimizes the possibility of wrong decisions. And it saves time in the end.

To illustrate, I'll explain the details of a recent project, a heat-treating installation.

The Problem

We make large printing presses in relatively low unit volume, so our heat treating isn't a mass-production operation. Some of it we did ourselves, and we contracted the rest—about $6000 worth a year. But we were dissatisfied with our existing equipment and with the quality of outside work.

The Solution

Our management decided to purchase four new furnaces. Our report of the facts and figures guided the decision. In addition to cost of equipment and savings, it included a summary of all pertinent facts and equipment specifications. The table on the facing page shows the economics, in final form.

With annual savings estimated at $3300 on an investment of $13,630, the new furnaces could be expected to pay back investment in about 4½ years, based on calculations before taxes.

But, between the statement of the problem and the solution there was an organized, thorough analysis. Here's the way we developed the answers:

STEP 1 • First, we had to find the actual present cost of heat treating. Some items of cost were represented accurately in cost records. They include: maintenance materials, some maintenance labor, operating supplies, fuel, spoiled work, outside contract heat treating. We used a representative period—generally a year—to get average costs.

Other costs had to be calculated, because records were inadequate. For example, to develop annual costs of rebuilding and rotating our old cyanide furnaces we multiplied estimated labor hours per occurrence by labor rate and usual number of occurrences per year.

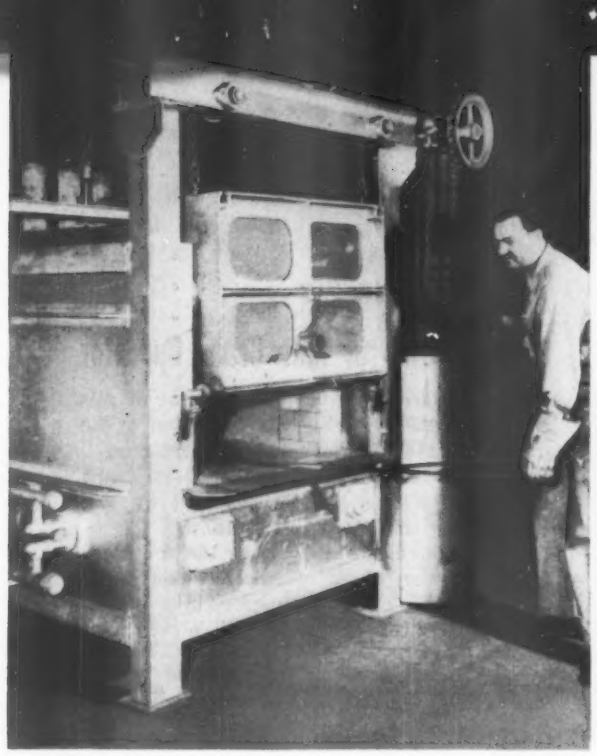
To calculate electric power cost we used this formula: Annual cost = hp. × 746 (watts per hp.) ÷ 1000 (watts per kwh.) × 8 (hours per day) × operating days per year × rate per kwh.

Compressed air, required to burn fuel oil, was more difficult to figure. We used handbook formulas to calculate air cost, in this sequence:

1. Pounds of air required to burn one pound of fuel oil.
2. Pounds of fuel oil used annually.
3. Annual volume of air (item 1 times item 2).
4. Hourly cost of compressor, based on horsepower formula.
5. Calculated compressor output of air per hour at required pressure.
6. Cost per 1000 cu. ft. of air (item 4 divided by item 5).
7. Annual cost of air (item 3 times item 6).

The phase 1 study also developed these facts:

1. Service department reports from our customers indicated heat-treat quality could be improved.
2. Inspection records showed quality of outside heat treatment was poor.
3. High rejections and uncertain deliveries of outside work upset our own production scheduling.



FOUR NEW FURNACES (one pictured above) solved the heat-treating problem, are expected to pay for themselves in 4½ years.

	ANNUAL COSTS	
	Present	Proposed
Outside heat treating	$6,288	$3,185
Depreciation, 15-yr. life		909
Personal property tax, @ 1.50 per $100 on 50% of average life value		51
Insurance, @ $0.21 per $100 of average life value		14
Maintenance labor	110	82
Maintenance material	565	423
Supplies	407	407
Fuel, oil	1,278	
Fuel, gas		682
Electric power	22	313
Air	455	71
Spoiled work, our shop	55	55
Spoiled work, outside	347	35
Total annual costs	$9,527	$6,227
Annual savings, out-of-pocket		$3,300
Cost of proposed equipment installed		$13,630

FACTS AND FIGURES guided the Harris decision to buy furnaces. This chart compares costs of old and new methods.

4. Present manual furnace controls allowed too much fluctuation in temperature.

5. We had no furnace-atmosphere control.

6. Heat-treating capacity was inadequate.

7. Our home-made oil-burning furnaces were inefficient.

With a complete picture of the problem and present facts and figures we were ready for . . .

STEP 2 • The next step was to find alternatives to existing methods and equipment. Here are the data we used:

- We determined what operations we wanted our heat-treating department to perform.
- An analysis of parts and lot sizes showed us we should have batch-type equipment. Also, we decided to continue to send small quantities of large gears outside for treatment.
- Our equipment must be economically capable of a wide range of temperatures—700F. to 2000F.
- We rejected the idea of gas carburizing and dry cyaniding because volume wouldn't justify the investment in required equipment.
- The relatively large volume of selective hardening and cyaniding would require special plating facilities—or salt bath furnaces instead of atmospheric equipment.
- But, exclusive use of salt bath furnaces wasn't practical because we have to shrink-fit some parts. Salt left on mating parts would speed corrosion.

All the facts guided us to a logical compromise —two salt pot furnaces, one for cyaniding and one for neutral hardening; and two horizontal furnaces for carburizing, tempering, drawing, and forming.

STEP 3 • Now that we knew generally what type of equipment we wanted, it was time to develop specific recommendations. First, we made general selections from industrial magazines and manufacturers' catalogs. Then we obtained furnace specifications and characteristics from manufacturers.

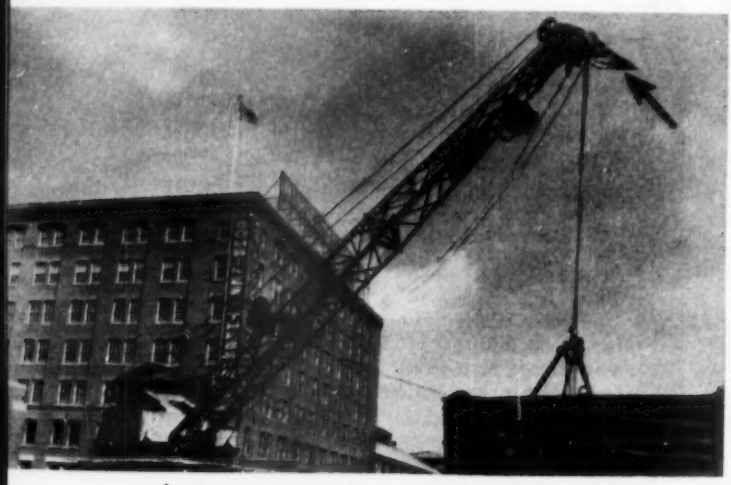
Our first step in the process of elimination was calculation of fuel costs. We found these costs in terms of cost per 1000 Btu., with the help of a handbook and manufacturers' specifications. Gas proved to be most economical for our plant, without a doubt. However, we also decided we should have one electric furnace to insure operation in case of gas cut-offs.

We compared competitive furnaces in terms of initial cost, operating characteristics, and fuel costs. We selected standard equipment, which let us inherit valuable operating data from the manufacturer's files. Knowing in advance the operating and fuel rates for each type and size of furnace, we could select the right ones for our operations and predict their operating costs.

STEP 4 • After we had determined what equipment we would recommend for purchase, we had to estimate the cost of installation. This estimate included every requirement we could uncover, from $1424 for running 633 feet of 4-in. gas line down to $6.80 for connecting power to a blower.

STEP 5 • The final step was to assemble data and recommendations into an organized report, which our top management used to make a decision.

OPERATING SHORTS



Boom-End Mirror Aids Crane Operator

A mirror (arrow) gives the operator of this crane a better view of the operation as he unloads foundry material from railroad cars.

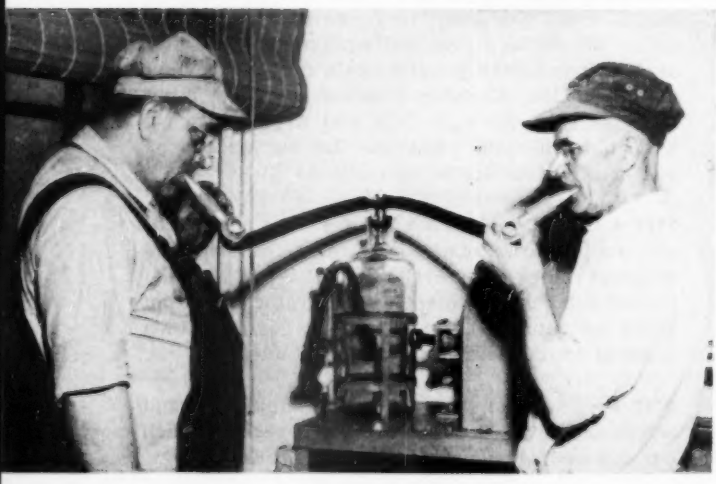
Mounted at the end of the 40-ft. crane boom, the mirror can be adjusted by two cables from the operator's position.

The Lorain crane was stripped of its treads and set on an 85-ft. elevated runway over concrete bins at John Deere Plow Works, Moline, Ill. It's self-propelled on crawler rollers.

Saw Cuts Around Worn Floor Areas

If your concrete floors need frequent patching, it might pay you to saw around worn areas before breaking them out. That's how the six Wisconsin plants of Consolidated Water Power & Paper Company save up to 50% in replacement material.

A Model C-130 Clipper "ConSaw" cuts around a damaged section to one-fourth the slab depth. This confines the air-hammer break-out to within the sawed area, thus gives smooth shoulders and prevents feather-edging. The saw's deepest cut is 6½ inches. Using it to cut floor trenches for lines assures spall-free replacements.



Aluminum Therapy Offsets Lung Acid

These foundry workers at The F. E. Myers & Bro. Company, Ashland, Ohio, are breathing a finely ground aluminum powder to neutralize an acid formed in the lungs by silica.

Aluminum therapy is said to benefit persons exposed to silica dust.

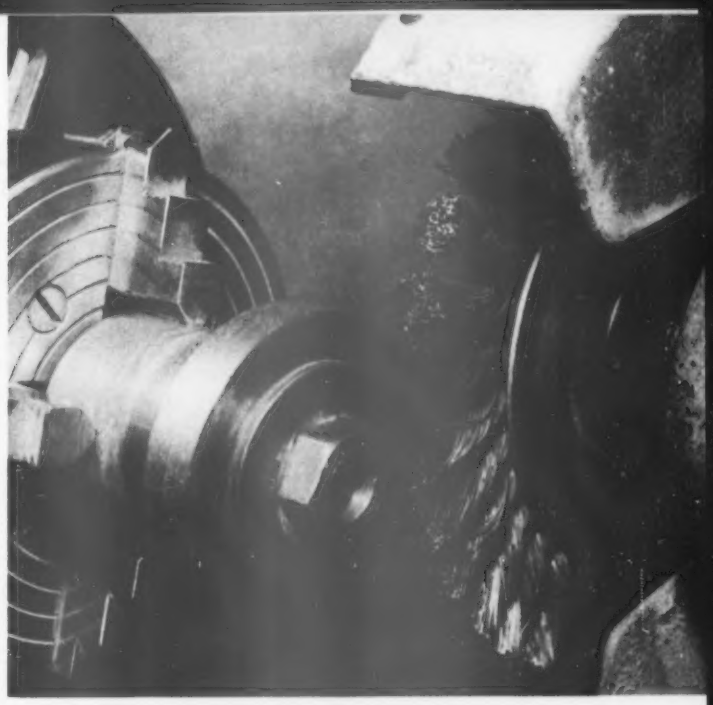
Myers workers are given 16 treatments a year. Doses start at one minute and gradually increase to six minutes, but are scaled to individual needs. Myers' therapy equipment was supplied by the McIntyre Foundation, Washington, Pa.

More Cuts From Diamond Wheels

A new brushing method increases the cutting action of used diamond wheels by 80% at S. K. Wellman Company, Cleveland.

After truing, wheels are dressed with an 8-in. wire brush. The brush removes some of the brass matrix. This leaves the diamonds sticking up for better cutting effect, thus adds to the life of each wheel. The brush and wheels rotate at 3600 rpm.

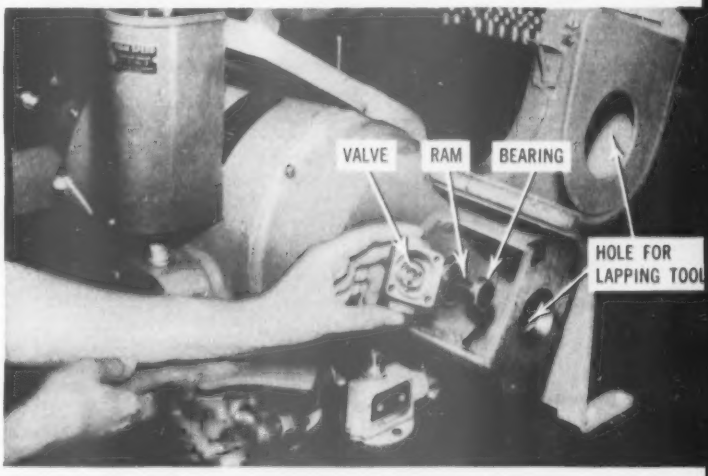
The new method was worked out by Wellman engineers with The Osborn Manufacturing Company.



Hand Job Motorized; Output Up 900%

A small valve made by General Controls Company, Glendale, Calif., requires three spots to be lapped to a precise dimension. Doing it manually produced three valves an hour.

Rotating the valve in a fixture increased production to 30 an hour, improved quality. An air-powered ram runs through the hollow shaft of a Reuland magnetic brake and ¾-hp. motor, holds the valve against the fixture, which is turned by the motor. A bearing on the end of the ram permits the valve to turn with the fixture. Operator laps the valve through a hole in the end of the fixture.



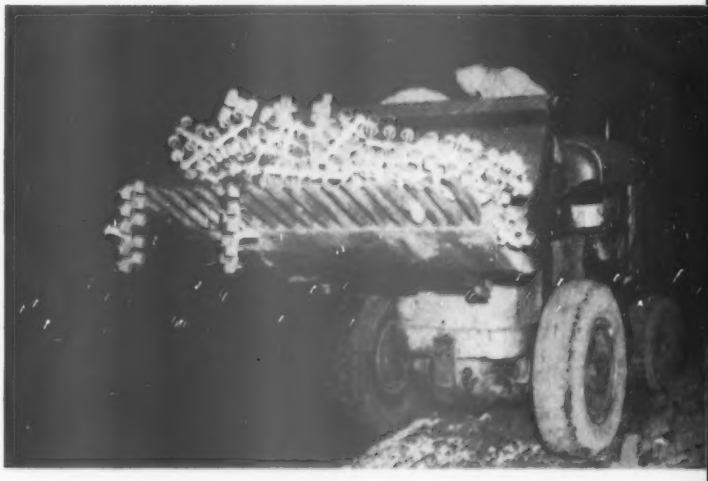
Tined Scoop Handles Hot Castings

By adding long tines to a bucket, the William E. Pratt Manufacturing Company, Joliet, Ill., has cut the cost of handling hot castings.

A Hough "Payloader" with special bucket scoops up castings immediately after they're hooked out of molds, then dumps them into tote boxes. There's no wait for castings to cool. Sand, picked up with the castings, sifts out between the tines.

Pratt's new handling method eliminates most of the old manual operation, which required eight men.

Turn the page



OPERATING SHORTS

... *Begins on page 110*

Signal Lights Down Downtime

Signal lights have reduced downtime on a semi-automatic inspection operation at The Timken Roller Bearing Company, Canton, Ohio.

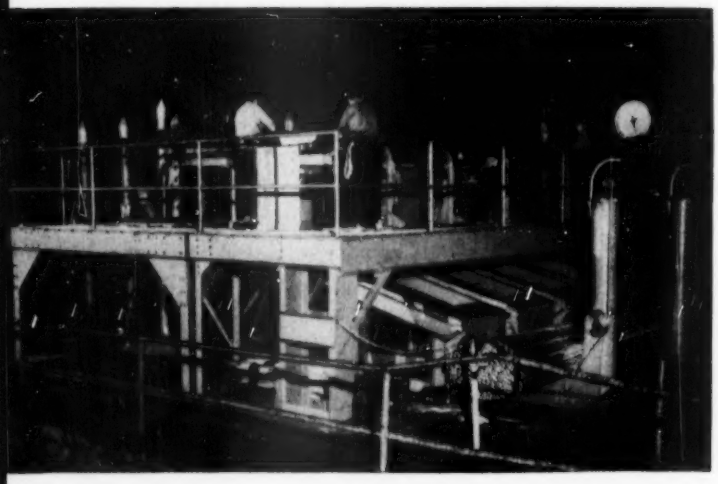
Formerly minutes were lost while inspector located the materials handler to report that her machine was empty.

Then two 7½-watt, 120-volt lamps—one red and one green—were mounted above control switches at each machine. The inspector turns on the green light when she's about two minutes from the end of her supply of material, adds the red light when she's ready for the next load. The red light alone signals machine trouble.

Two Plants Share One Gatehouse

Remote control enables one gatehouse to serve two large plants at Chase Brass & Copper Company's Cleveland Mill Division, Euclid, Ohio.

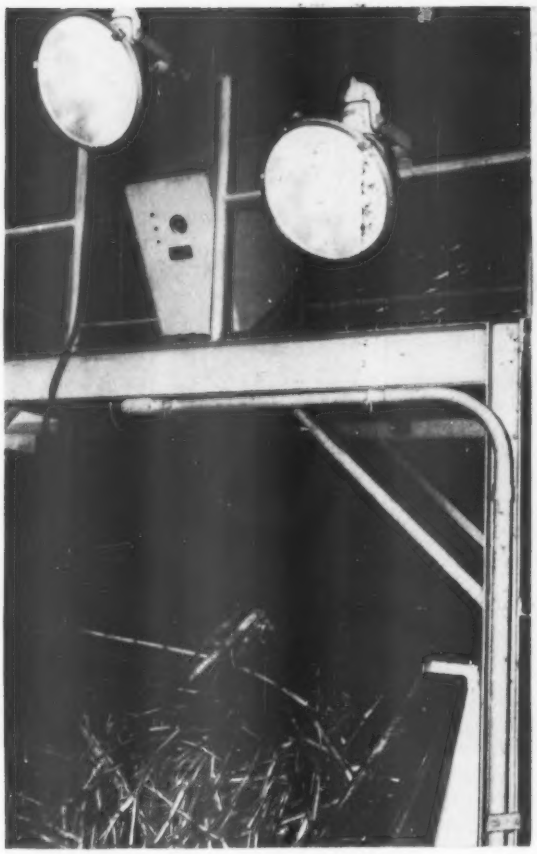
The gatehouse is at one plant's entrance. Seated there, a guard has a clear view of the other plant's gate on the opposite side of a main highway. A 110-volt, pushbutton control circuit lets him open and close the 25-ft. sliding gate. Power is supplied by a ½-hp., 440-volt, 3-phase, 60-cycle motor.



Pipe Bundled on Raised Platform

Continuous weld steel pipe is bundled on an elevated platform at Spang-Chalfant Division of The National Supply Company, Etna, Pa. Bundles then slide down to a scale at floor level. The three men who tie up each bundle do no lifting, no walking.

Pipe is placed on the bundling table's four skid rails. At each skid's end is a wheel with three equally spaced nests cut into it. After a bundle is tied in a nest, a foot pedal is pressed, and the wheels make a one-third turn. This discharges the bundle, positions nests to receive the next lot of pipe.



LIGHTS AND TV CAMERA focus on sugar cane conveyors at a Hawaiian plantation, show up a jam-up before it happens.

OPERATOR WATCHES the TV screen, changes speed of any one of four conveyors as necessary to insure smooth flow of cane.

With industrial TV...

One Operator Controls 4 Conveyors

Two Hawaiian sugar plantations are using industrial television to help control the flow of sugar cane through their mills.

Ewa and Waialua plantations find that the TV set-up enables a single operator to keep an eye on the cane as it moves along 250 feet of conveyors carrying cane between the cleaning plant and the grinding machinery.

It's the operator's job to control four variable-speed conveyors—to stop pile-ups and attain a fast, smooth flow.

Both plantations are using closed-circuit TV systems, including cameras, coaxial cables, and receivers. Keeping the camera lenses free of dirt was a big problem. It seems to have been solved by mounting the cameras above and beyond the reach of dirt and spray, with due consideration to the trade winds, and enclosing them in dust-proof cases with an extra piece of glass in front.

The cameras record the picture of the cane moving into the mill conveyor and carry it by coaxial cable to a control center where an operator is watching. The installation cost of about $7500 is expected to be made up in about a year by attaining smoother flow and fewer jam-ups—and by using one man for a job that used to take two.

Waialua had tried to use mirrors for conveyor control. They didn't work. Too much vibration and dirt.

WITH OLD LOT SIZE, International Resistance used small toteboxes shown piled up at workplace. "Positioning" meant needless manual handling by all workers.

NEW LOT SIZE (double the old) called for bigger toteboxes and better position-

Spent $15,000 to save $65,000!

How We Doubled Lot Size—and Cut

By WILMER C. COOLING
Manager, Methods and Standards Department
International Resistance Company, Philadelphia

YOU HEAR A LOT about making bigger unit loads to cut costs in receiving, shipping, and storage. Same thing applies to handling work in process.

We just doubled the size of production lots. It cost us approximately $15,000 in changes. But we save approximately $65,000 a year. Such a change can be made quickly, too. Ours took only nine months—from idea to complete installation of all necessary equipment.

We could have cut months off that schedule if we could have used a standard totebox. Actually we had to design a special box, ask for bids, place an order, and wait for delivery.

The $65,000 saving came from . . .

. . . **production control** · Clerical work halved; use of production coupons halved.

. . . **accounting** · Key punch operations on yield reports halved; scale operators' work reduced.

. . . **direct labor** · Operator output increased through more efficient handling; machine output increased through reduction of set-ups.

. . . **indirect labor** · Materials handling reduced; machine set-ups reduced.

This isn't the end of our program aimed at cutting materials handling costs. It's just the beginning. The idea came out of a conference on a proposal to install a considerable amount of handling equipment. Investigation proved the idea was sound. Now we're tailoring future mechanization plans to lot sizes.

HOW WE GOT STARTED · It was our productivity indexes that first pointed up the need to do something about materials handling costs. Since 1942, direct labor productivity has increased steadily, overhead has remained constant, and indirect labor

ing at workplaces. Here, toteboxes are delivered and taken away by roller conveyor. And they are slid, not lifted.

Indirect Labor Costs

productivity has dropped. Most of our indirect labor is materials handling, so handling improvements stand high in our methods program.

HOW WE PLANNED • Figuring a new lot size demanded consideration of two limitations: (1) the weight of material a female operator could slide from one roller conveyor to another; (2) a quantity that would come out evenly when divided by our various mold capacities.

Investigation showed that doubling the lot size, plus the increase in totebox size, was close to the maximum weight the operator could handle. Perhaps a further increase could have been made—more than doubling the lot size—but, to avoid confusion and to facilitate planning, doubling the lot size appeared most practical.

After the lot size had been determined, cost estimates of installation costs and savings were made. They included cost of molding benches for larger toteboxes, roller conveyors for molding workplaces and finishing machines to eliminate lifting boxes, larger molded type toteboxes, Masonite separators for new toteboxes, new scale scoops, recalibration of scales for handling double quantity.

The estimated savings included cost reduction in materials, direct labor, indirect labor, and overhead. This estimate indicated that the installation costs would be paid off in approximately five months. We have been concentrating our efforts on projects that have a pay-off period of six months or under. This project met that requirement; it paid off in three months.

HOW WE MADE THIS TRANSITION • Such a change presents many installation problems during the transition period. We assigned a coordinator to handle problems during the transition period so that the equipment and new work methods could be installed without slowing down production lines and increasing production costs. The coordinator was the general foreman in charge of production operations for the whole process, a line man with a high degree of authority and responsibility. He was chosen for this job because he would have the majority of the production problems during the installation period. The more important problems were:

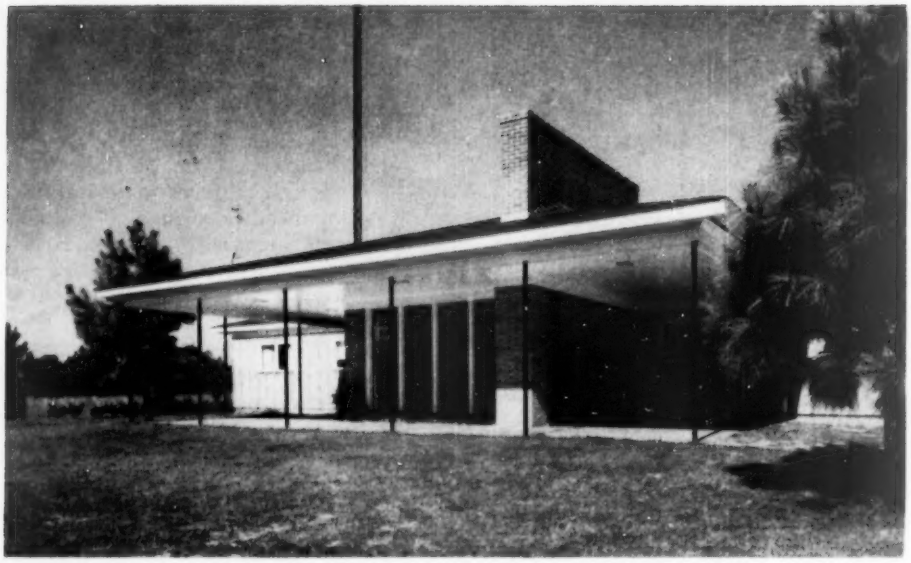
- Orient and instruct management personnel involved.
- Orient and instruct union personnel involved.
- Purchase and get delivery of new equipment
- Alter workplace benches without machine downtime.
- Install roller conveyors in workplace area without machine downtime.
- Recalibrate scales without slowing production.
- Plan and schedule the increased capacity.
- Revise quality control procedures for the larger capacity.
- Start process flow through the departments in the new lot size.
- Adjust incentive standards to realize direct labor gains.
- Adjust indirect labor manning to realize indirect labor gains.

The changes involving workplaces were completed without machine downtime, and with the production operators operating on incentive. In the mold room, for example, one complete workplace was prefabricated in the shops and installed at the mold press as a unit. A wooden box was placed on this workplace, at the disposal position, to enable us to run single lots through this process until the time double lots were started through the production lines.

The workplace that was removed from the first mold press was altered and installed at another mold press. This replacement method was followed until all the workplaces at the mold presses were completed. Similar procedures were followed in the other production departments.

PROBLEM: Small plant
Small town
No hotel
Plenty of visitors

SOLUTION:



WESTINGHOUSE'S $65,000 GUEST HOUSE COSTS $1200 A MONTH TO RUN, ENDED FIRST YEAR IN BLACK.

Company-Owned Guest House That Pays Its Way

FINE FOR EMPLOYEES to live in. But rough on visitor!

Westinghouse ran smack into this all-too-common headache two years ago when it picked the small town of Hampton, S. C. (population 3000), as the spot for its Micarta Division.

Company engineers, technicians, and executives from out of town—and representatives of other companies—found that driving 30 miles to Walterboro and the nearest hotel took the edge off what might have been an enjoyable plant visit.

Solution: Micarta Lodge. Dr. E. R. Perry, Micarta manager, came up with the idea of solving the problem by means of a modern ranch-type guest house. Westinghouse management sparked to the idea, so the house was promptly built.

Result is a handsome structure, located in a residential area and blending into its surroundings with no hint of commercialism. It's operated primarily for the use of transients directly associated with the company's activity. But it has other uses, too. It serves as a lunch club for supervisors at the plant. In addition, all supervisors and their families are welcome to dine at any time, and to use lodge facilities.

Micarta makes no attempt to offer the facilities of the lodge for community activities where there might be any conflict with local enterprises. But

HANDSOME L-SHAPED LIVING ROOM AT MICARTA LODGE IS MORE INVITING AT DAY'S END THAN 30-MILE-DISTANT HOTEL.

MICARTA LODGE can sleep ten people in its five twin-bedded guestrooms — each with connecting bath and shower.

WELL-APPOINTED DINING ROOM seats sixteen people, serves company also as luncheon club for plant supervisors.

the division does cooperate in community efforts such as the annual Watermelon Festival, when visiting dignitaries need accommodations.

Cost of building was substantial—$65,000 (the building cost $40,000, furnishing $25,000). But, much to everyone's satisfaction, it's paying its way. In fact, figuring one way, it's even making a little profit. Works like this:

Guests pay their own way. Only the occasional visitor who would normally be entertained by the company is subsidized. The charge for room and board is set at $7 per day. But, for company personnel, the average expense per day was $3 more before the lodge was built. So that can be counted as $3 saved per day for each company man who stays there. Figuring this in, the lodge came out with a profit of $1500 for the first 11 months of operation. Not figuring this in, it fell just short of breaking even, missing by $300.

To date, the average cost of operation has been $1200 a month. This includes all supplies, wages, and service and maintenance expense. Approximately 15% of this is charged to entertainment of guests.

Operating control of the lodge is in the hands of a committee of four plant supervisors and the lodge supervisor. This committee has a rotating chairmanship, changing every three months. Its job is to develop a program of entertainment for supervisory employees and their families, and to oversee the operations.

The facilities are in good balance with requirements. Only rarely is it impossible to take care of everybody who wants to stay.

HAROLD E. BLISS
Assistant Controller
Lukens Steel Company
Coatesville, Pa.

C. B. MUIR
Manager
Works Facilities
Canadian General Electric
Company, Ltd
Peterborough, Ont.

WALTER H. PAGENKOPF
Superintendent
Technical Service
Western Electric Company
Hawthorne Works
Chicago

R. S. STEWART
Commander, CEC, USN
Bureau of Yards and Docks
Washington, D. C.

STUART WHITEHEAD
General Superintendent
Maintenance and
Construction Department
Calco Chemical Division
American Cyanamid Co.
Bound Brook, N. J.

JOHN B. WHITLOCK
General Maintenance
Engineer
Armco Steel Corporation
Middletown, Ohio

Listen in on a panel session at the Plant Maintenance Show. Let industry experts tip you off to best current practice, as they answer questions about . . .

Work Measurement in Maintenance

Q What is work measurement as applied to maintenance?

A STEWART: Work measurement as applied to maintenance is no different basically than work measurement as applied to any other expenditure of labor. It is based normally on time studies and job analysis. There has been some difficulty in applying work measurement to maintenance expenditures for labor because of their great va-variety, and inability to absorb administrative costs.

Q What procedure should be followed to create the right climate for good work measurement and standards?

A WHITLOCK: I think before we start answering that question we shall have to assume that the principle of applying work measurement is concerned not so much with the payment of premium to the men as with earnings for the company. With that assumption in mind, I have a procedure that we follow that I should like to suggest to you for your consideration. When you go into a department, either maintenance or production, for work measurement, it is essential that you obtain the cooperation of the men who are being measured. We have a series of meetings with these men, explaining the purpose of work measurement and what we intend to do, and what we hope will be the outcome of the work at hand.

After these meetings have been held and the men are acquainted with the procedures to be followed, then the industrial engineers go in and make the measurements—with the cooperation of the men. During the course of these measurements, the results are discussed with the men. At the end of the discussion we often find that many clear-cut suggestions have been made.

When the studies are finally completed, and the standards are ready to be applied, they are carefully gone over with the men so there is no misunderstanding. The standards are generally ap-

plied over a trial period of about 30 days, when adjustments can be made. During that trial period, no premium is paid. But at the end of the trial period, if both parties are satisfied that the standards are fair and just, with a possibility of earning premium not only for the men but also for the company, then the standards are put in force and the men are measured.

Q Over how long a period must performance records be kept to provide a fair basis for work measurement?

A WHITEHEAD: Performance records will not give you a fair basis for work measurement. Performance records—and by such records I mean the tabulating and keeping of the historical backlog of man-hours to do a certain job—will only give you a historical record of what has been the average time to do that job. Performance records leave out a very essential point in work measurement, and that is the "effort rating" of the men. Those of us who know the pacing that groups will go to, in a specific craft, know that they pace themselves at considerably below a daywork pace.

Q What should be the relationship of work simplification to work measurement and work standards?

A PAGENKOPF: In answering that question I am assuming that you are starting from scratch and do not have standards established. I don't think any attempt should be made to establish new standards until the work has been simplified—at least to the extent possible without prolonged study or research. Once having established your standards, then it would be well to get into some development and research to see what can be done to put in new methods that would further reduce the standards you have set.

Q Do time standards on maintenance work serve to keep management in line as to providing effective tools, methods, and supervision?

A MUIR: Yes. Standards would specify the most efficient tools and methods. If the management expects the workers to do the work as called for, it must supply the equipment.

Q How valuable are ratio standards in measuring non-productive work—that is, so many maintenance man-hours per thousand production man-hours?

A STEWART: I believe that, within the same or similar type of industry, ratio standards used to measure non-productive work are quite helpful in highlighting excessive costs. Beyond that, however, it is still necessary to make detailed investigations as to the cause of such excessive costs.

Q How does the use of work measurement affect the load carried by supervisors?

A BLISS: The initial load placed on the supervisor at the beginning of a program of this type is certainly far greater than it is when you move into a smooth-working system. Many of the problems that develop at the beginning of the program are ironed out, and the men adjust themselves to the procedures and to the planning. They carry on more as a matter of habit after the program is fully developed.

Q Does the work measurement application tend to complicate or simplify paperwork?

A WHITEHEAD: If you apply work measurement to the maintenance department, by necessity you add to the paperwork. However, the goal of the maintenance department is to maintain your plant economically and effectively, and the addition of this paperwork may have a beneficial effect on your over-all goal. There is no question in my mind but that it will add to the paperwork.

Q What is the union attitude toward work measurement and standards?

A MUIR: That depends on the union. There are some unions, I am sure, who would object to it just on general principles. However, once we have sold the worker, I don't anticipate much trouble.

A WHITLOCK: I think, in the main, our unions are in sympathy with the work measurement plan we have. I think the leadership of the unions has become more intelligent as time has gone on. They see the advantage to the men of these incentive systems—if you get across the idea that the incentive is a device not to increase work, or to make the men work harder, but to make the men work more efficiently.

Q When using work standards, is there an advantage to standardizing on kinds of equipment?

A WHITLOCK: I think the answer to that question is definitely "yes." The more standardization of equipment, the greater the efficiency.

A PAGENKOPF: Some special types of equipment might result in considerable cost reduc-

tion. A manufacturer should compare maintenance savings with excessive manufacturing costs, which might exceed the maintenance costs many times. It would require study.

Q Over what range of work, expressed in number of man-hours, can work measurement and standards be applied effectively?

A WHITEHEAD: It is my opinion that work measurement can be applied effectively over all ranges of work. However, to avoid a lot of the detail, I suggest that jobs under 2 man-hours be classified as "Small Jobs" and credit be given. Then you have routine jobs which can easily be measured, and on which standard times can be set, since the work content is generally the same. You also have your larger jobs. Generally, they are your repair jobs or your emergency jobs. If you use that general breakdown, I think you can say that there is no man-hour limit.

Q What type of personnel do you recommend as analysts for work measurement?

A WHITEHEAD: Practically every maintenance department has a form of work measurement. Craft supervisors are experts in work measurement. They know from experience how many man-hours most jobs will take.

In our experience, the best analyst is a first-class craftsman, chosen for his ability to think. Another way to get a good analyst is to start with a time study man and try to make a craftsman out of him. We prefer the first procedure because we think it is an easier conversion.

Q Will formal estimating, not based on standards or studies, result in greater efficiency?

A WHITEHEAD: I assume the questioner means that all the jobs are estimated by man-hours and that he does not have time studies or the use of standards. Certainly, I consider estimating a very essential part of any scheduling and planning program. If it is done well, you develop a greater degree of efficiency and you may improve your estimating, too.

Q What type of personnel do you use for estimators in incentives?

A WHITLOCK: We call those men checkers. They estimate the number of units of work in the job, and follow it through to completion. They are all college graduates. Some are engineers; some have liberal arts degrees. They have been given an intensive course of about six months in this type of work. Over these checkers assigned to the individual shops there is a general supervisor. If questions arise as to the accuracy of the estimate, he is there as a court of last decision. We find that it works very well. Some jobs cannot be estimated ahead of time, especially if they are maintenance jobs out in the field. In such cases these same checkers go out in the field and follow the work.

Q How could you set up incentive systems where it is necessary to change over a fairly large area of your plant because of model changes?

A WHITLOCK: We change the old standards. The industrial engineers come in and study the process. They are given three weeks to complete the job. At the end of three weeks the new standards are established, negotiated with the union representatives, and placed into effect on a 90-day trial basis. If, at the end of 90 days, the new standards are satisfactory to both the men and the company, they are put into effect and the men are paid retroactively for the 90 days. They are not paid the new rate for the three weeks' study period.

Q Does the imposition of work standards and measurements reflect in changed accident records in the plant?

A WHITLOCK: Our incentive system is based on the number of units of work in a job. If the supervisor decides that five men can do that job safely and economically, and they do it in an hour, they will be given a certain number of units of work. Now, if four men can do that job, and do it well, naturally the men involved get a greater number of units of work. For example, when we started the premium payment we used to have three men as crane followers out in the mill. They had a certain number of units of work to move a certain number of tons from this position to that position. It was soon evident, however, that those men were going to work at a very low rate. One man was taken off, and, naturally, the productive effort of the other two men increased, and so did their unit payment. But we discovered it wasn't safe. We were hurting more people than ever before. That is an isolated example of accident increases as a result of premium payment. But I haven't been able to see that our accident rate has increased as a result of premium payment. This is not a method of speeding up, but a method of better management.

How to Use Gloves

Using the right kinds of gloves the right way in the right places is a sure formula for healthier hands and better-quality production. The photos on this page come from Chance Vought Aircraft, a division of United Aircraft Corporation, where 30,000 pairs of gloves were used last year.

This is one plant that really has workers sold on the value of wearing gloves—the right kinds, too. That's a big accomplishment—worth shooting for in your plant.

LIGHT COTTON — actually pall-bearers gloves in this case, give employee little protection, but do a real job in protecting finished materials from skin oils and corrosion effects of perspiration. Hazards of such gloves is that they give a false sense of protection. They should never be allowed where operator works with moving machinery.

LIGHT RUBBER — fine for jobs like this, where chemicals in powder are kept from hands, and where super-finish on metal is also protected from oils in skin. Light and intermediate weights also excellent in plating operations. But watch out for oils and greases. Specially compounded rubbers are often needed.

HEAVY COTTON — like these common work gloves, are fine for "blister protection," and work well for small parts handling jobs involving minor sharp edges and burrs. Watch out, however. Cotton gloves, of any weight, should not be used around moving machinery or portable power tools. Nor for handling sharp-edged materials. Use cotton gloves with special palms of leather or other materials. Or use gloves of non-snagging materials suitable to work.

HEAVY RUBBER—stands up under severe conditions of operations like this one, where sandblasting demands real protection of operation. Major plant uses for heavy rubber gloves crop up in electrical maintenance work, too. There frequent testing for defects in insulating characteristics are a must.

LEATHER—often the only fully protective type of glove to use for special jobs. Heliarc welding, for example, as in this picture. Note that gloves are heavy here, and coupled with related protective gear, including the big asbestos apron. Don't forget: leather's not for electrical work—and it's porous, so shouldn't be substituted for light rubber gloves.

ASBESTOS—invaluable for hot jobs, as in this case where worker is taking tools from a 1600-degree heat treating bath. Big danger here is possibility that operator may overestimate heat insulating qualities because of magic name asbestos. Solution is careful training of workers in limitations of types of gloves available.

SPECIAL DESIGN—frequently as important as the material the glove is made of. Here, for example, the long cuffs prevent hot chips from being thrown up worker's sleeves onto wrists and forearms. Other desirable design features, depending on jobs: tight-fitting cuffs, mitten design instead of separate fingers, and partial coverage for special applications.

A TOBY QUINT EPISODE:

"Make a speech? Who? Me?"

By RAY W. SHERMAN

JACK DEAN, PLANT ENGINEER of Central Manufacturing, hunched his six feet of worry and trouble over his desk and read the letter again. It said:

"Dear Mr. Dean: The Central City Civic Club is asking executives to talk to us about what makes the wheels go round in our city's factories.

"We should be honored if you would tell us, out of your experience, what is involved in keeping a plant running and in good repair. It must be a fascinating story.

"Could you be our guest at lunch the 17th and talk to us for twenty-five minutes? And have you a picture of yourself for newspaper use?"

He read it again. Down at the roots of his brown hair was a queer sensation, as though his scalp was crackling. He started to draft a declination, but finally dragged his lankiness aloft and ambled toward the front of the building.

Plant Manager Tobias Quint looked up at Jack and down to the letter again. He finished reading.

"That's fine, Jack."

"Fine, my eye!" Jack sagged into a chair. "I never made a speech in my life!"

"It won't be a speech. Just a talk," soothed Toby.

"Fireside chat, huh?"

"Look, Jack." Toby began a slow and serious patting of the desk. "This is great stuff for Central. Makes friends. Swell public relations."

"Let Eddie Lee do it," Jack snapped. "He's public relations, isn't he?"

"What does he know about maintenance?"

"Well—" Jack shrugged "—let's skip that one. But what'll I do?" He extended both hands. "I don't know how to make a speech!"

"Oh, come now. Anybody can make a speech."

"Sez who and how?" Jack demanded.

"First," said Toby, "figure out how to quit."

"Huh?" Jack's jaw dropped. "Say that again."

"First—" Toby began counting on raised fingers "—you figure out exactly what you're going to say to make an exit. That's so you won't find yourself with no way to get out. Write it down.

"Next—" a second finger "—figure out just what you're going to say to start. Write that, too.

"Then—" a third finger "—you figure what you're going to say in the middle."

"Middle? Yeah, that's where I'll be."

"Look, Jack." Toby leaned forward on folded arms. "Every man knows more than he realizes on a lot of subjects. Trouble with you is, you don't know what you know."

"I know I can't—"

Toby ignored the interruption. "The way to find how much you know is to take inventory. Put down headings. Put facts under the headings. You'll be amazed." Toby began writing. "One could be 'Why factories have maintenance men.'"

"Listen!" Jack aimed a finger. "Only for our crew—"

"See!" Toby laughed. "Another heading, 'Kinds of men in a crew.'"

"Oh, my gosh!" Jack's hands flew upward. "What haven't we got? Plumbers, riggers—"

"What's a rigger? Some of 'em won't know."

"A rigger," said Jack, "is a guy who does everything slow, and, just so he won't get out of practice, he looks at a job for half an hour before he starts to work."

Toby wrote: "Definition of rigger." Raising an eyebrow, he asked: "Tough jobs I've had?"

"In only twenty-five minutes?"

"OK." said Toby. "Put some of 'em down. Then: 'Tools required.' 'Preventing breakdowns.' 'Overtime work.' 'Production cost of some breakdowns.' 'Funny things that have happened.' You can think of more." Toby slid the sheet across the desk. "You'll think of some when you're falling off to sleep at night."

"If I sleep," said Jack.

"One thing will suggest another," Toby added. "Soon you'll have more than you can use. Write or shape up, what you're going to say on each one. It will help fix it in your mind. After you've done that, rehearse your speech. Aloud. In front of a mirror. Make it fit your time.

"Write the headings on a sheet, clearly, so you can read it on the table. And DON'T read the speech! Eye the clock and at the fixed time quit! You'll do swell, Jack." Toby smiled reassuringly. "Central needs speakers. It's good business. The Old Man's strong for it."

"He'll—be—there?" Jack's eyes widened.

"Sure," Toby laughed. "He told 'em you'd make the speech."

Jack's arms fell limply at his sides.

"Didn't you tell me once," asked Toby, "that a plant engineer was a fellow who did everything nobody else wanted to do?"

"And," Jack sighed, "at the time I thought it was a very funny joke."

Look through The back pages ...

... **Important New Catalogs.** Helpful on your job. Free. Just check the coupon and mail it to us. We do the rest. **Page 154.**

... **Maintenance Pointers.** One way to get your men to take better care of machinery ... A radiant heat panel that hangs up like wallpaper ... Does keeping track of detailed costs mean more paperwork? **Page 156.**

... **What's New in Equipment.** Here's your monthly trade show. This month's feature: 3-Way Maintainer, a housekeeping machine that disposes of dirt in short order. **Page 162.**

... **Practical Labor Relations.** Significant labor developments through the eyes of an experienced negotiator. **Page 222.**

... **Plant Engineering Problems.** Tips on licking them. For instance: Easy-to-install tile pipe for fumes and wastes. **Page 246.**

... **Plant Operating Problems.** How do you get more storage space? Answers to that and other operating problems. **Page 250.**

... **You Mustn't Miss.** Circus-type materials handling show coming your way ... Horizontal press produces at both ends ... How to save time and money in drafting. Just samples of the sort of reading you'll find in the column beginning on **page 276.**

... **Books and Booklets.** A guide to current reading that gives you a hand with your work. Leads off this month with a review of William B. Given's *Reaching Out in Management*, a book that tells you why employees *should* cross organizational lines. **Page 314.**

... **Industrial Films.** Fast-reading reviews, pitched to your needs. This issue features reports on 12 films for training or orientation on radioisotopes. **Page 322.** (See also "How You, Too, Can Use Radioisotopes," page 84.)

... **Behind the Byline.** Maybe you'd like some dope about FACTORY's outside authors. You'll find photos and brief biographies starting on **page 330.**

... **New Materials Handling Equipment.** Fast review of important developments. From a survey by the Material Handling Institute of its 79 member-companies. **Page 256.**

CASES IN METHODS IMPROVEMENT

DE LAMAR BED SPRING COMPANY, Los Angeles

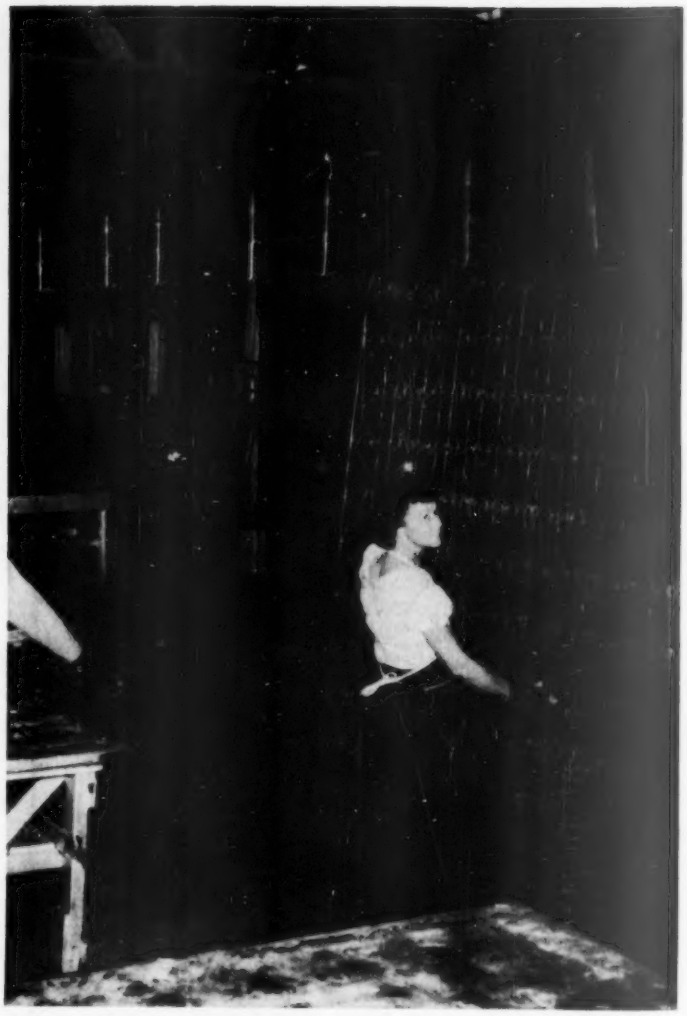
Six Productivity Boosters

When brother-partners Jack and Bill DeLamar talk about production methods, they sound like enthusiastic stamp collectors bragging about their latest acquisitions. Their factory manager, Bob Herod, talks the same way.

Actually, their search for better methods is no hobby. It's sound business. Here's why:

Over the past ten years, production at DeLamar has doubled, but the labor force has increased by only one-third. Despite higher wages, labor cost per unit is no higher than it was ten years ago. There have been materials savings, too, and quality has been significantly bettered.

Six important principles guided Jack and Bill and Bob in their methods improvement endeavor. And they've chosen six sample improvements to show how. There's one for each principle. Need we add that the same principles will do as much for you as they did for the DeLamars?

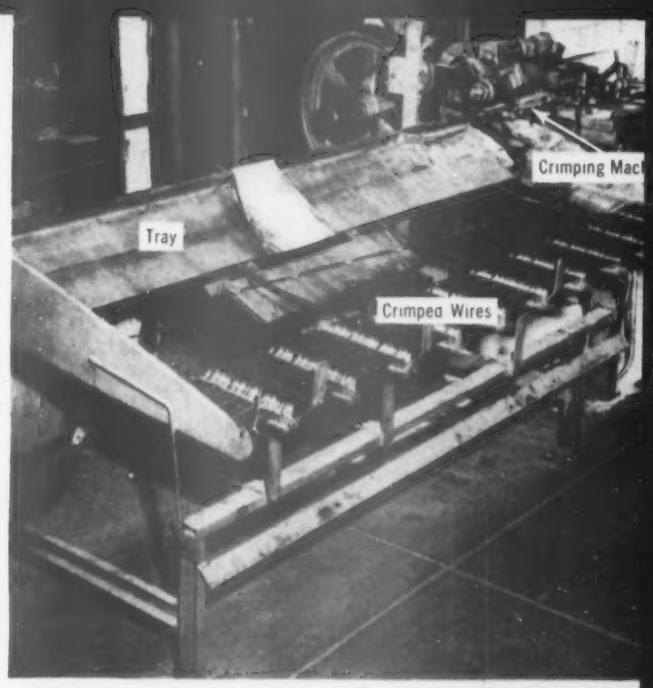


1. Get highest utilization of equipment

When a conveyor was being installed to carry the assembled springs to the paint booth, the DeLamars found it easy to calculate a reasonable speed to handle current production. But an increase in production of any degree would mean either another conveyor or speeding the one conveyor up to a point that would make hanging difficult and the trip through the paint booth too fast. To cope with that, they simply put two-way hooks on the conveyor. It can now be loaded from both sides. Capacity was doubled without speeding it up. The one-third production increase since the conveyor was installed in 1947 has been no problem. A ½-hp. motor is sufficient to drive the 400-ft. conveyor at 8 to 10 feet per minute.

2. Mechanize routine manual jobs

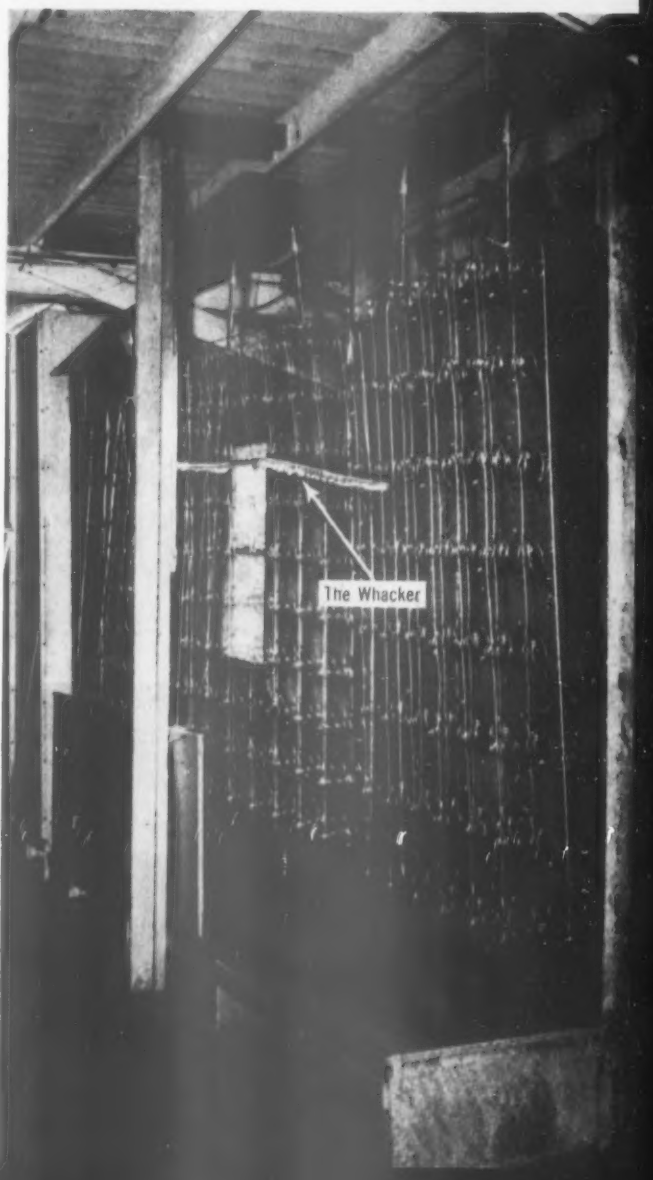
There are four crimping machines to crimp the wires that hold the spring coils together. When the crimped wire lengths were stacked by hand, each machine required a separate operator. The DeLamars logically concluded that automatic stacking would mean a big manpower saving. Together with Herod they devised a stacker. The crimped wire feeds out onto a tray from the crimping machine. The knife that automatically cuts off the proper length of crimped wire trips a dog latch on an overrunning clutch, which tips the tray and allows the wire to slide down bars to a retainer. A counterweight returns the tray to its upright position. All that's required is for a man to come by from time to time to remove the neatly stacked wires and take them to the assemblers. Instead of four men, there's now only one tending the crimpers. The $300 modification cost to each machine paid for itself within a month.



3. Keep automatic devices simple

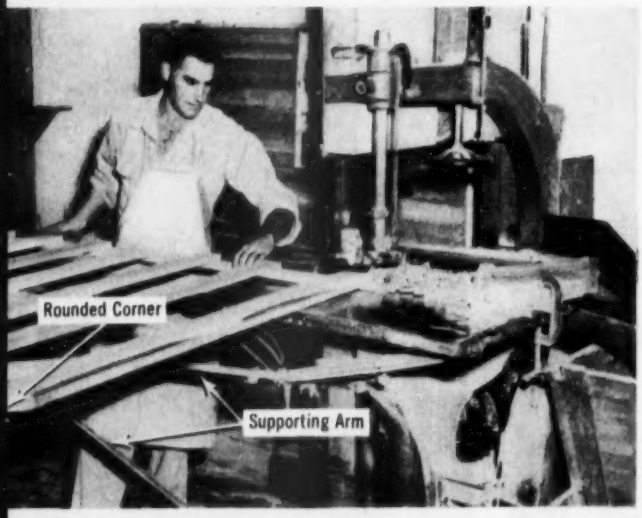
In pre-war days, DeLamar hand-sprayed each spring with enamel, an expensive operation. During the war, springs were not painted at all. After the war DeLamar started painting again, this time with aluminum. To do the job, they designed a paint booth using a flow-coat system. Spraying in an open-ended booth is frowned upon by the fire department, so they use two heads which flow the paint over the springs as they move through on the conveyor. A 30-in. roof fan provides ventilation through ducts at both ends of the booth. In this method of paint application, a serious problem is "tears" that form as the paint flows down over the springs. The DeLamars thought at first of having bumps on the conveyor tracks that would joggle the springs, knock off the tears. But the conveyor moved too slowly for this to be effective. So they devised a Rube Goldberg. It's a spring-loaded arm with a length of synthetic rubber hose on the end of a piece of pipe. A ¼-hp. motor draws the arm back and releases it, so that it whacks the bed spring. Each spring is whacked five or six times as it passes. The tears are knocked off, fall into a trough, from which the paint is recovered. The DeLamars estimate they recover enough paint from each spring to paint another. It takes only four or five gallons to paint a day's production — 900 bedsprings. The whole device — using an old gear reducer that happened to be on hand — cost only about $75.

Turn the page



4. Adapt ideas from other industries.

In making wooden frames, there are 18 pieces to be assembled and nailed together. Doing it all by hand is time-consuming. It also takes about six months to train a nailer properly, and many beginners give up after bashing their thumbs a few times. So the DeLamars decided to go automatic. They had heard of the automatic box top nailers made by Food Machinery & Chemical Corporation. So they called on FMC to design a machine to fit their needs, and FMC did so, adapting components of its standard nailers to the new use. Mounted on a steel table, the nailer works like this: Frames are locked into a jig. Cross slats and corner braces are fitted into place. The jigs are hooked onto a chain drive that feeds them through the nailer, automatically stopping at each nailing point. The operator presses a foot pedal to make the nailing strokes—28 nails on the first stroke, 4 on the second, and so on. Clinching is automatic. Average production is about 90 frames per hour, and it takes 15 minutes to change from one type of spring to another. The nailer requires 3 men in place of 5, and does a better, more consistent job. It cost $20,000.

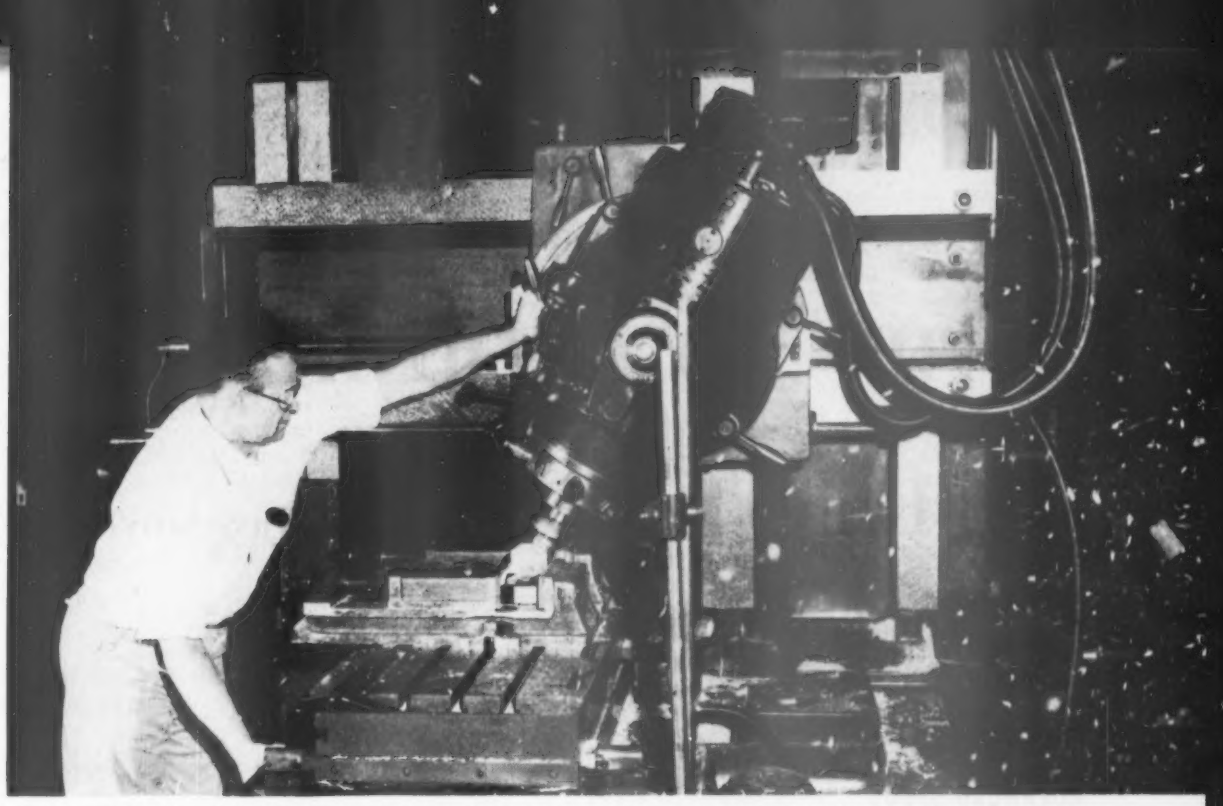


5. Use mechanical aids to get uniform quality

Corners on bed frames must be rounded. The individual boards that meet in the corners used to be rounded separately. Now the corners are rounded after the frame has been assembled. To do this required merely a light modification to a standard band saw. All that was needed was to add a freely swinging arm with a small shelf, which supports the frame while it is turned around the saw. This was a move for quality, not cost saving. Actually, the DeLamars figure it costs a little more than the old method, when a stack of identical boards were sawed simultaneously. But the new method gives a truer curve to the corner, and eliminates the possibility of bad fits which might cause snagging when ticking is put on.

6. Observe motion economy rules

The spring-to-frame assemblers use a jig and conveniently positioned pneumatic tackers. Where assemblers used to position the spring on the frame by hand, a jig is now used that places the frame and has uprights with slots that guide the spring into position. It saves time and insures a consistent fit. Stapling used to be done by hand, until DeLamar cooperated with California Wire Products in designing an air tacker. The air tacker allows two men to staple 700 springs in a day, whereas with the old stapler one man's production was only 150. The tackers are attached to overhead air hoses.



FLYING CHIPS GIVE DRAMATIC EVIDENCE OF THE SPEED OF THIS MILL — 6 INCHES PER SECOND THROUGH ALUMINUM

"You'll run machines at higher speeds . . ."

. . . we wrote in our April 1952 story on the "Factory of the Future." Here's one example—a new high-speed milling machine.

THE SPEED DEMON shown above making the chips fly is being tested for the Air Force at Consolidated Vultee Aircraft Corporation's Fort Worth Division. Convair reports it's not only faster, but better, too.

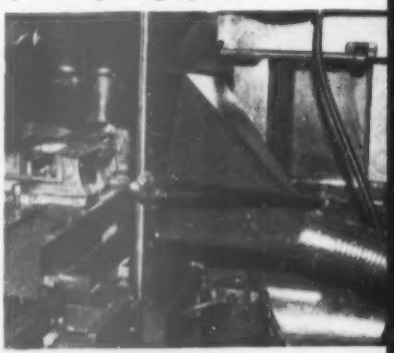
It's a new, one-and-only high-speed milling machine for nonferrous metals. The usual concept of "high-speed" is slow, compared to this machine. It starts where the others leave off. Conventional milling machines reach maximum capacity at 1800 rpm. This one starts at 1800, goes up to 10,700 rpm. —astronomical compared with conventional mills.

Table travel is fast, too—375 inches per minute, more than 6 times the standard 60 inches per minute. It takes this mill just 8 seconds to cut a 4-in. furrow the length of a 4-ft. aluminum bar. Table-return speed is even faster.

The machine was made by Cincinnati Milling Machine Company, under Air Force contract. It is approximately the same size as a standard mill, with a vertical head and an 18x18-in. table. The head can swivel 45 degrees to either side. Bearings are water cooled, and mist lubrication is used.

Cutters for the mill were designed by Convair's tool department. Design is such that the intense frictional heat is transferred to the chips instead of the work, thus avoiding one cause of warpage in the work piece.

To catch the flying chips—see photograph above —Convair uses the motor-driven suction attachment shown at the right. It's much like a giant vacuum cleaner. It sucks in the chips, automatically loads them into mobile hoppers for removal.



CHIP COLLECTOR is always used in actual operation of the mill.

Monthly reports on the machine's performance are sent to the Air Materiel Command's production and resources division by the manufacturing research section of Convair's tooling department.

Convair has reported great success with the machine, so far. According to B. G. Reed, assistant division manager, this machine is milling B-36 aircraft parts to a degree of finish and flatness never attained with conventional milling machines.

TIPS TO GOOD HUMAN RELATIONS for factory executives

By M. J. MURPHY • Industrial Relations Editor

STIMULATING ADVANCED STUDY BY KEY EMPLOYEES Here's another evidence of the continually growing interest of top management in getting key people in the company to improve their technical know-how:

International Minerals and Chemical Corporation, Chicago, announces a new twist on a half-tuition refund plan. In addition to the usual refund, the company will allow time off to attend classes up to six hours a week without loss of pay. Applies only to individuals taking graduate or advanced college level courses. Sounds like a fine incentive to develop those "hyphenated engineers" many managements are now seeking (see FACTORY, February 1953, p. 83).

KEEPING WORKERS WELL INFORMED ON PLANT NEWS The photo above shows the latest method of getting hot and interesting news to employees fast at The F. E. Myers & Bro. Co., Ashland, Ohio. The company finds it can capitalize nicely on full texts of all its regular news releases to papers and radio stations. Releases are posted one day in advance of release date, so employees get the story first. Postings are on special "news release bulletin boards" located near the time clocks in all the company's four plants and the main office.

But that's not all. Myers also has a daily news broadcast over its public address system, five minutes before the afternoon shift begins. Items posted on news release bulletin boards are also broadcast. These include promotions, new products, and special events such as visitors, employee activities, and company plans and policies. Broadcasts also include recreation activities, employee birthdays, weather, and other items of personal interest. Important spot announcements of news as it happens are made over the public address system during working hours as well. Copies are also posted. For example, an election by the board of directors.

The way this company operates, one thing's sure: Nobody can complain, "They didn't let me know!"

HOW TO GET MORE FROM REPORTS ON LABOR TURNOVER Too often labor turnover reports are cold sets of statistical data. They worry executives, but they don't offer clues to improving the situation.

Here's one solution that's simple and effective as used by Taylor Instrument Companies, Rochester, N. Y. Supplement your regular statistical reports with a name-by-name listing of all employees who left with five or more years of service. Taylor also lists the recorded cause of separation, date of last merit increase, and pay rate at time of leaving. By thus personaliz-

ing turnover, the company feels it gets real thought as to preventive action in future cases.

Here's how Industrial Relations Director Afton S. Dodge puts it:

"Turnover is a bothersome and costly thing. We fight it continuously. When it embraces a person having five or more years of service, we consider it a major catastrophe and a subject for special attention. The very fact that we report it as we do keeps us all conscious of the importance of the problem. Supervision is encouraged to analyze the reports with the personalities in mind to discover what caused the turnover, and as a basis for recommending constructive policy changes."

PUBLIC RELATIONS FOR SALESMEN Another sign of the changed attitudes of plants toward salesmen from other companies—in recognition of their value as outside "idea men":

A. R. Smiles, factory manager of International Paint Company's Union (N. J.) plant, provides us with a sample of a neat little card holder that his plant gives to every visiting salesman. Holder contains this message:

"Thanks for coming to see us. You are always welcome at International Paint Co., Inc. Do accept our little remembrance of your visit. This little card holder will keep your cards crisp and clean. Should you desire some of these card holders for your associates, do not hesitate to ask. Thanks for calling."

NEW TWIST IN TUITION REFUNDING Most tuition refund plans provide a flat refund on "satisfactory" completion of a course, usually with a grade of *C* or better. The aim is to give employee-students incentive to complete the course.

But *Bell Aircraft News* tells of an additional incentive that's been added by Bell Aircraft Corporation, Buffalo. Works like this: Amount of refund varies with the grade received, instead of being a flat sum or percentage. At Bell, three-fourths of tuition is refunded for grades of *A*, one-half for *B*'s and one-fourth for *C*'s. Sounds like a pretty good idea—worth trying in your own company.

CREDIT UNION ACCOMPLISHMENTS If you have a credit union, or are thinking of having one, here's some information that should be of interest. It comes from the U. S. Labor Department's Monthly Labor Review for February 1953:

There are currently 11,279 credit unions, operating about 50-50 under state and federal charters. They have better than 5-million members. Their total assets at the end of 1951 were almost $1.2-billion, and net earnings fell just under $40-million.

Big business! And growing, too. Between 1949 and 1951, state credit union membership grew by 20%, and federally chartered unions grew by 36%.

How important? Very, the figures say. In 1951, credit unions provided *12% of all consumer installment loans outstanding at the end of the year.* So don't underestimate that "little" credit union of yours. Or don't shrug off the idea if someone proposes setting up one in your plant. It's a big and important kind of activity.

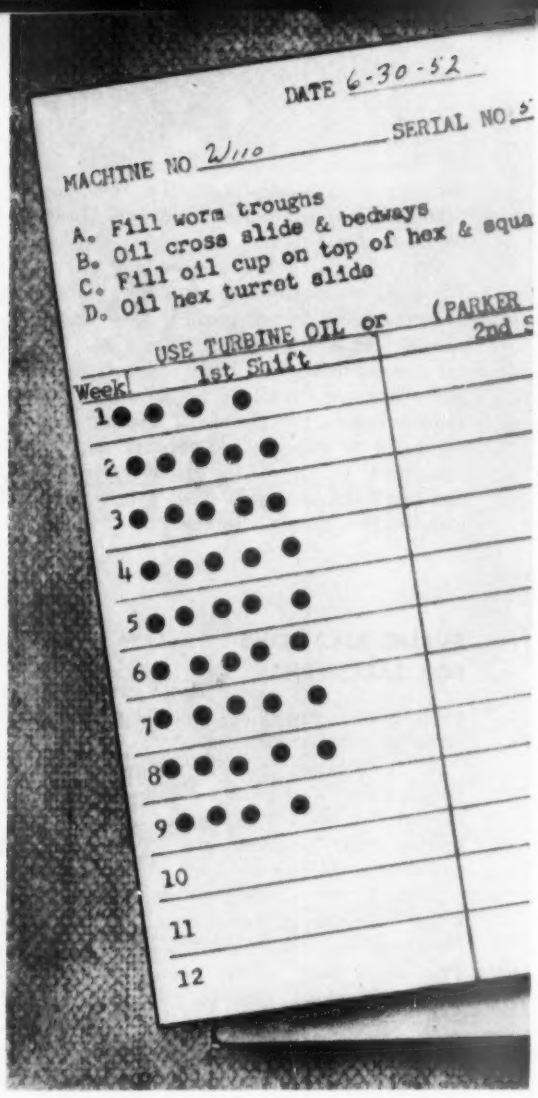
"SKY'S THE LIMIT" SUGGESTION AWARDS A year and a half ago, The Parker Pen Company, Janesville, Wis., tossed out its time clocks—part of a plan to change the tone of its employee relations. Now it's adopting what it calls its "idea exchange" plan—a suggestion system with no ceiling on amounts of awards. In addition, the formula for cash awards provides for a 50-50 split of first year's savings achieved by any idea submitted by an employee. This is another evidence of a trend toward substantially increasing award formulas in industry.

An Ideal Lubrication Program for a Small Plant...

...gets the right lubricant on the right machines—at the right times—with no fuss and little paperwork.

FEW SMALL PLANTS brag about their "ideal" lubrication programs. And the Jet Division of Parker Appliance Company, Cleveland, isn't one of them. But it *does* think (and so does Midwestern Editor Bob Dilley) that its program measures up right well to what a good program ought to be.

- **One man oils all the machine tools in the shop every day—64 machines all told.** He also performs a weekly service on each machine.
- **He makes no written reports on the work he does.** Instead, he ticket-punches a schedule card attached to each machine when he finishes oiling it. Punching is quicker and neater than writing.
- **Individual cards for daily, weekly, quarterly, and semi-annual lube service are attached to each machine.** And according to the schedule they call for, the oiler performs daily, weekly, and quarterly lubrication service. A machine repairman performs the semi-annual service.
- **For quick identification, lube fittings are painted to match the cards.** Red fittings, lubricate daily. Blue, weekly. And the same lube schedule card will soon tell the oiler how many lube points to cover on each machine.
- **Supervision of the system is simple.** Operator, repairman, and foreman can tell at a glance what lube service has been given any machine.
- **Lubrication doesn't interfere with production.** If a machine is in the middle of a run, the oiler goes on to the next.
- **Training a replacement for an oiler, either temporary or permanent, is easy.** Cards tell him how to lubricate all key points—and when.
- **Only one other essential to consider:** To make the system work, oilers must be conscientious and properly trained.

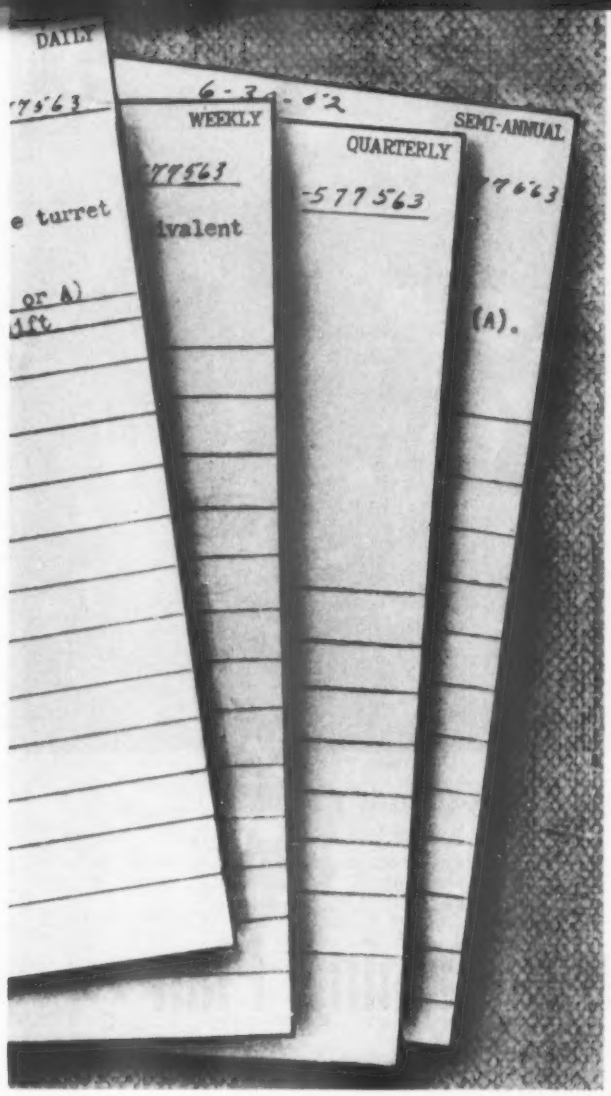


LUBE CARDS ARE KEY TO SYSTEM • Four lube schedule cards for each machine comprise the only paperwork. Cards are shown above.

The daily card is cherry-colored, and can be used 12 weeks before it needs replacement. Weekly card is blue; quarterly, yellow; semi-annual, white.

All cards are 4 by 6 inches and are printed

FITTINGS MATCH CARD COLORS • To simplify the system even more, lube points and fittings on machines have been painted to match the card colors. Thus red fittings are lubricated daily. Blue ones are serviced weekly; white ones, semi-annually. The oiler is responsible for daily and weekly lubrication of all machines, but a machine repairman makes a quarterly inspection and performs the quarterly and semi-annual lube service. New cards, to replace those now in



with appropriate data on ordinary duplicating equipment.

Service data printed on the upper half of the cards are taken from the machine manufacturers' lubrication recommendations. Parker tailors the data on its cards to the lube requirements of drill presses, turret lathes, millers, grinders, lapping machinery, hones, etc.

CARDS POSTED AT EACH MACHINE · Each machine has its own set of cards. They're tucked in plastic pockets and hung on a board from cup hooks. The board is usually clamped to the conduit bringing power to the machine. After performing the required lube service, the oiler punches the right ticket. He doesn't have to write a thing on any of the cards, so they remain fairly clean.

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use, will also tell the oiler how many fittings or lube points get each service.

LITTLE SUPERVISION NEEDED · With an oiler who knows his job and does it right, this system is extremely simple to supervise. Random checks of cards and machines are made by the maintenance foreman and machine repairmen.

Machine operators, too, can report to their foreman if lubrication is missed.

With cards the only physical record, cost of the system is exceedingly low. When Parker started the system it had fewer machines. As new machines were purchased, their lube schedules were worked in so that one man now services 64 machines.

Lacking such a system before, Parker now expects efficient lubrication to reduce downtime and breakdowns enough to pay for the cost of operating the system, and turn in a tidy profit besides.

One other indication of its workability is that a substitute oiler was put on the job once. Using the cards, he mastered the job in a matter of minutes.

Graduating class of 300 journeymen is just one result of Dow Chemical's varied . . .

Plant-of-the-Future Training Plan

Here's what Dow Chemical is doing *today* to meet needs of company growth and new skills demanded by changing technology.

It's a program you can start using today to fit your company needs as it moves toward its "factory of the future."

A STAFF REPORT OF THE EDUCATIONAL DEPARTMENT
Richard D. Freeman, Director, Labor Relations and Education, The Dow Chemical Company, Midland, Mich.

IN RECENT YEARS at Dow we have seen the growth of constantly broadening concepts of the contributions organized training can make to a rapidly expanding company. These are several reasons why this is so:

1. Rapid technological developments are requiring increasing job knowledge on the part of employees. Much of this is quite specialized—certainly in the chemical industry. We must train to keep current.

2. The area around Midland from which we draw our labor supply is not heavily industrialized. In fact, it is predominantly rural. There are relatively few opportunities to hire trained men in the various trades and other jobs requiring specialized skill. Dating from the early 30's, we have chosen to develop our own training resources to meet this need.

3. As channels of communication lengthen and become more complex, morale problems assume greater importance. Suitable training and development help to resolve these problems, too.

Basic Policy

It should be emphasized that Dow's management has consistently held that training is the responsibility of line supervision. This basic policy has markedly influenced the activities of the educational department at the Midland plant. Fundamentally this department is a service organization,

maintained to *help* line supervisors to discharge their training duties.

The educational activities conducted by the educational department have all been requested by line supervisors, mainly for one of three reasons:

1. Because the scope of the training is too great for line supervisors to handle along with other duties;
2. Because the type of training requested is so specialized it requires our services; or
3. Because the training involved applies to many or even all departments, and thus can be handled more economically by a centralized training group.

Another policy that guides our planning and thinking: We deliberately avoid offering programs that are basic to the regular public school system. The schools provide a backlog of common abilities and skills. Our educational program provides courses aimed at developing the *special skills* required by our people to do their jobs.

Appreciation of the need for sound training policy and practice is not new at Dow. It has always been present in management's thinking. One of its earlier indications was the appointment in 1932—more than 20 years ago—of a committee to study training needs. The work we are doing now is an outgrowth of that committee's efforts.

Now let's turn to some of the major areas where we are currently gearing training to the steadily expanding needs at our Midland plant.

Maintenance Training

The maintenance education group in the educational department handles the nonsupervisory training programs in the shops and service department, which consists of about 2500 men. They *serve* the shops and service departments by helping to develop skilled men to provide the best plant maintenance and service facilities possible for some 500 buildings of all kinds and descriptions spread over an area of several hundred acres.

To give you some idea of how our maintenance programs operate, let's take a brief look at the . . .

ELECTRICAL INSTRUMENT GROUP • A man coming into this group is hired as an instrument helper. He must be a high school graduate, have natural ability for this work, must be in good health, and must pass an aptitude test with a grade of 75% or better. These tests consist of problems in electricity, scales and meter reading, sketching, arithmetic, algebra, and problems in mechanics and science. A mental ability test is also used. Aptitude tests are used in most shops and in the auto mechanics program in the garage department.

First a helper: A man must work a minimum of 9 months as a helper before he is eligible to become an instrument senior helper. His practical daily work during this period consists of general shop work, stockroom work, calibration, and helping a journeyman or technician in the field with repair or installation work.

During the last 6 months of the 9-month minimum period he is given classroom work consisting of 60 hours of electrical mathematics and 18 hours of physics. Every two or three weeks during this period the helper is given a test. Assignments are such that homework required is in excess of the classroom time if the helper is to be successful.

. . . **then a senior helper:** If at the end of a minimum of 9 months the helper passes the required tests, he becomes a senior helper and enters an 18-month training period. In this particular program we have broken training into three 6-month periods. Periodic tests are given, and examinations must be passed at the end of each six months.

The classroom work during these 18 months consists of 18 hours of blueprint reading and 351 hours of instrumentation. The senior helper is rotated frequently with journeymen and technicians to get as much diversification of work as possible.

. . . **then a journeyman.** At the successful completion of this 18 months' training, the senior helper is eligible to become a journeyman instrument man at the journeyman starting wage bracket. If no journeyman opening exists, he is placed in a senior helper pool until such time as there is an opening in the journeyman classification.

If a trainee fails to pass a final test, or if he fails to have an average of 75% or better on the periodic tests, he is given 30 days to seek other employment in the plant or be released to the employment department. Our formal training ends with the completion of the senior helper training.

OTHER GROUPS • While this is an example of the training in one department only, the procedure is somewhat similar in the other shops and service departments—although there are differences in progression, time in classification, class time, etc.

Training agreements are written for each shop and service department. The agreement outlines the requirements for men entering each classification, the procedures governing the program, and also the courses given in each classification.

These agreements are developed jointly by the shop supervisors, shop stewards, and the educational department. Union participation and cooperation have been important factors in the success of our programs.

Classes are held on company time. They vary in size from 1 to 12 men. Most of the classes have about 6 men. Classes meet from one hour per week to 4½ hours per week.

Men enter our maintenance training programs either through job postings or by being hired from

outside the plant through our employment department. Once a man enters training, he must continue in the training program until he has completed all of the requirements for entering the journeyman classification. Each man receives a certificate upon completion of his training.

At the present time we have 125 men in our training program, averaging about 375 trainee-hours per week in classes.

We use a few standard textbooks, but the text materials that best meet our needs are the manuals and workbooks we prepare ourselves.

We use many of the standard visual aids, such as 16 mm. movies, 35 mm. strip film, opaque and slide projectors, flip-charts, flannel boards, models, cut-away sections, and mock-ups. Experiments used in our physics and instrumentation courses are also helpful visual aids.

Most trainees are rated monthly on field performance by the foreman. That rating, together with the classwork record for the month, is reported to shop supervision.

Five full-time instructors in the maintenance education group, several special instructors from shop supervision, and one clerk comprise the personnel handling these training programs.

Power Training

Early in 1944 the management of the power department realized it faced a major problem—to train new employees and to bring old employees up to date in the operation of complicated power equipment, the design of which is constantly changing and improving.

To solve the problem a power departmental educational committee was set up. The committee adopted a program after consulting with top management, the educational department, and the labor union. The program continued on a limited basis until the fall of 1945, when the committee decided to enlarge it to cover all power department personnel, with a full-time instructor.

COURSES FOR EVERYONE · First step was to set up a well-equipped classroom in a central location. Courses were then revised and improved to meet the broader needs of the new program.

After two months, two firing courses were completed and running in the new classroom. In the meantime the outlined curriculum was designed and textbooks were selected.

The enrollment at the present time is 225 in all power-training courses. To date, slightly over 1100 people have graduated from the various courses. Classes are held once each week on company time for 2-hour periods with the stipulation that 2-hours' home study must be assigned to the student. We now offer the courses shown here.

All courses must be passed with an average of 70%. If the student is successful, all books and instruction loaned to him during the course become his property, except the orientation text. At the completion of the course a certificate of recognition is given to the student.

TRAINING AIDS · As the training was planned to be on-the-job type and about Dow's own equipment, the textbooks had to be written and illustrated by Dow personnel. Another problem that arose was the necessity of an improved agreement with the union to assure the enrolled students of job advancement and make the course a requirement for such advancement.

POWER DEPARTMENT TRAINING PROGRAM

1. Orientation course
   Prerequisite for all new employees (4 weeks)

Operating Department

Firemen
1. Burner and pulverizer course (24 weeks)
2. Feedwater equipment course (24 weeks)
3. Cyclone boiler course (16 weeks)

Engineers
Prerequisites: All fireman courses, except for Class "A" engineers and dispatchers.
1. Steam turbines and generators, Part I (20 weeks)
2. Steam turbines and generators, Part II (24 weeks)

Coal Handlers
1. Coal conditioning course

Maintenance Department

Prerequisite: Burner and pulverizer course
1. Power maintenance, Part B (32 weeks)
2. Power maintenance, Part A (36 weeks)

Instrument and Control Department

Prerequisites: H. S. graduate; physics or chemistry for No. 3
1. Electrical course (48 weeks)
2. Instrument course (48 weeks)
3. Water-conditioning course (48 weeks)

(Note: The water-conditioning course was designed for training those men concerned with instrumentation, laboratory control, and chemical treatment of boiler feedwater.)

A departmental agreement with the union, now in effect, requires each man to take the course related to his classification before advancement is granted. In other words, job progression is geared to the training program.

All types of visual aids obtainable are employed to carry on the various courses. Huge models are used to teach maintenance men the adept use of micrometers, verniers, protractors, and other instruments. Slides, slide films, movies, conferences, talks by outside engineers and technical men are

all employed to give the best possible instruction in any one course.

Another problem that confronted the instructor and the educational committee was the fact that many of the men had been away from school for quite some time. As a result they had lost the knack of studying. Consequently, in some of the courses instructors review such subjects as mathematics, blueprint reading, and the fundamentals of physics before starting the main part of the course.

Production Operator Training

Every new production operator receives indoctrination and on-the-job training. This is an accepted, well-understood responsibility of line supervision.

However, recently many Dow production superintendents have realized that it is not enough to give employees training in the basic skills their jobs require. The feeling is that our chemical process (production) operators should know all that can reasonably be taught them about their process and equipment. As equipment and process become increasingly complex, this is the one way to increase employee satisfaction and performance on the job. As a result, we have set up three kinds of training:

1. LECTURE SERIES · In two departments so far, we have given a series of lectures, spread over a 6-week period, to all supervisory and hourly personnel. Lectures are given during working hours. Experts in the production areas involved do the training.

Primary objective of this training, in addition to safer operation, is to produce a more uniform product through more perfectly controlled operation. The program is coordinated by a man in the department. He gets advice, assistance, and teaching aids from the education department, but he plans and conducts the training sessions himself.

2. TRAINING IN ADVANCE · This approach is now being used for brand-new plant installations that have never been run before. Before the process is started up, we train foremen and operators to understand their process and equipment thoroughly. Training is done in classroom sessions over a 2- or 3-month period.

This may mean, for large plants, that we train foremen separately. On the other hand, for smaller plants, it may mean classes where foremen and operators study the process and equipment together. The educational department provides instruction and help in planning these courses.

3. SPECIAL OPERATOR TRAINING · Classes of this type include head operators, crew leaders, subforemen, and certain special hourly men. They may run for a year to a year and a half. One 2-hour classroom session is held each week.

The process operator who has completed this course receives a certificate of completion. We also have an agreement with the local union by which job progression of the individual is coupled with this training.

Supervisory Development

To a large extent, employees reflect the type of supervision under which they work. A problem employee cannot continue to be one indefinitely if he works for an exceptional supervisor. Nor can a good employee help but be changed somewhat if his supervisor ignores the rules of good supervision. Thus, it is impossible to improve the attitudes, techniques, and skills of supervision without likewise having a real effect on all employees in the company.

We feel the foregoing is sound justification for intensive effort, in many directions, to improve supervisory performance. As the result of what has been done to date, we feel we have achieved the following benefits at Dow:

- Communications, up, down, and across lines of authority, have been improved.
- Supervisory techniques and skills have improved —particularly in dealing with people.
- Supervisors have a better attitude toward the company, and more of a realization of the important role they play in the success of the company.
- The attitudes and morale of all employees have shown substantial improvement.

Here are some of the details of the several programs we use to bring about these results:

1. TRAINING FOR NEW SUPERVISORS · New supervisors are relieved of all job responsibilities for a period of one week to take part in a supervisory induction course. They meet in the educational department for that period of time in groups of eight to ten.

Employees becoming supervisors for the first time have a real adjustment to make. This adjustment has been fairly well recognized in those employees who have come up through the ranks. But we have observed that the new supervisor who is a technical man usually has just as big a problem. Many times he has not had the opportunity to learn human relations by rubbing elbows with the other employees as the nontechnical man has done.

The purpose of this 1-week program is to start the men thinking along lines that are important in

their new responsibilities. This program lays heavy emphasis on many types of group discussion techniques.

Members of the educational department spend this week with the new supervisors. In addition, various people in the company are called in to handle particular topics relating to supervisors and supervisory problems. At the conclusion of the week, all new supervisors enter the regular monthly supervisory program.

2. REGULAR MONTHLY CONFERENCES · Well-planned meetings are held monthly during regular working hours for approximately 900 plant supervisors at all levels. For these meetings supervisors are divided into groups of approximately 20, each group composed of several different levels. Actual meetings are led by 10 line supervisors who have been appointed by their production managers to work part time on the supervisory development program. These 10 supervisors, together with three employees of the educational department, comprise the leader's group. It is the responsibility of this group to plan all meetings, to lead them, and to report back to top management on significant results.

3. DISCUSSION LEADERSHIP TRAINING · Many supervisors in modern industry have to lead a large number of group discussions. In Dow, many such meetings in the past were relatively ineffective due to the leader's lack of skill in leading discussion meetings. Discussion leadership training is designed to change that situation.

Supervisors meet in the educational department in groups of eight to learn how to improve their discussion leading skills. The course consists of four half-day sessions held on company time. Most of the time is spent in actual practice.

4. ECONOMIC EDUCATION · Part of the subject matter of the regular monthly supervisory meetings covers economic problems confronting our company and the basic economics of the American way of living. Growing out of such meetings at the supervisory level was the realization that meetings in this field should be scheduled for all Dow employees.

Two plant programs have been given to all employees during regular working hours. Attendance has been voluntary. These programs were entitled "How Our Business System Operates," and are a Dow adaptation of programs of the same name originally developed by DuPont. The emphasis is on group discussion. The leader's job is to ask the questions and remain entirely neutral while the group discusses them and tries to arrive at satisfactory answers.

The educational department has worked out these programs, has coordinated them on a plantwide basis, and has trained the necessary leaders to carry them to 20,000 employees in all Dow plants. At the present time almost all of our employees have spent a minimum of 10 hours in such discussions.

5. PUBLIC SPEAKING · The department has cooperated with the Dale Carnegie people in making their course in effective speaking available to Dow employees. This has undoubtedly been helpful to many. However, a rather substantial percentage of present supervision believe that they would supervise more effectively if they had additional training in communicating better with employees. Further action than that which has already been taken is probably indicated.

6. NEW PROGRAMS · Two new programs in supervisory training are now in process of development. Both will be presented during normal working hours by members of the educational department.

(a) Pre-supervisory training. This program will be given to possible future supervisors at the level immediately below first-line supervisor. The course will be very similar to the supervisory induction program. It is felt that two main purposes will be served by giving supervisory training at this level.

Employees immediately below the first-line supervisory level will be better prepared for openings in supervision when they occur. And the line supervisor will be better able to evaluate the potential of possible supervisors if they are given training while still in a semi-supervisory capacity.

(b) Supervisory development of office supervisors. As a result of positive accomplishments in meetings held for plant supervisors, pressure has been accumulating to present a human-relations program designed for the office supervisor. Details of this course will be somewhat different from that planned for plant men. But the major emphasis will still be on working with people.

College Graduate Training

We give considerable attention to the problem of assimilating technically trained young college men. Normally it takes several years of experience for these men to use their knowledge really effectively. But we know from experience that a properly planned training program can shorten this period considerably.

To accomplish this result, we use what is called our "special-assignment program." It consists of six to eight training assignments, averaging six weeks each. During each period, the trainee is placed in one of our research, engineering, or production groups. He is given a definite assignment on necessary and important work that is of cur-

rent interest. Assignments are picked where accomplishment is measurable. In other words, there is a definite beginning and end. Emphasis is put on work that gives the supervisor involved a chance to observe closely the trainee's abilities and work habits. Also, we emphasize jobs where the trainee has the chance to plan his own work and draw on the knowledge and experience of others.

We supplement this program with a series of weekly meetings. These explore important phases of company operation, such as plant maintenance, labor relations, human relations, sales, production planning, and financial matters. Trainees also take occasional group trips to observe department activities.

These meetings are led by plant men in responsible jobs who know what they are talking about, and who themselves furnish examples the trainees can do well to emulate.

After each assignment, the trainee prepares a written report, submitted to the head of the department in which the training took place. This is evaluated by the department head, and is graded along with the trainee's work performance. Such information is entered on the trainee's personnel record.

Administration of the program is in the hands of an over-all coordinator in the educational department. He works with department heads in selecting and planning job assignments. He is also responsible for time schedules, transfer of trainees to new assignments, and all other operating details.

A major benefit of this program is that we know much more about trainees and can do a better job of placing them on permanent work. But the trainee also learns a lot about the company and its activities. Thus he is able to state intelligently his own job preference, too. His opinions are valuable, and are sought and considered before final placement is made.

Other Training Activities

The foregoing training activities are those that should be of major interest and value to plant operating executives. But, among the other training programs carried on at Dow, there are three that deserve some mention:

1. ADVANCED EDUCATION FOR TECHNICAL MEN • Midland is located about 80 miles from Lansing, the nearest fully equipped science and engineering training center. This complicates matters for men who want to take advanced courses toward higher academic degrees.

The problem has been largely solved through the whole-hearted cooperation of Michigan State College and the University of Michigan. Fully accredited courses are offered in Midland, open to anyone in the community (not just Dow employees). It is possible, under the plan, for an excellent student in Midland to take a master's degree at Michigan State by attending courses on the campus for only one 10-week term. All the other courses could be taken by the student right in Midland.

The University of Michigan has established a chemical engineering program which will allow a student in Midland to take up to two-thirds of the work required for a master's degree.

Up to now, a full year's work in organic chemistry has been offered, plus a course in chemical kinetics and one in thermodynamics, and one in organic reaction mechanisms. Other courses are now projected. Similarly, undergraduate courses are offered, and will continue to be offered.

2. LABORATORY TRAINING • You cannot run a research laboratory just with scientists and engineers holding bachelor's, master's, and doctor's degrees. Skilled assistants are required as well. And at Dow in Midland there are between 250 and 300 hourly paid men who fit in this class.

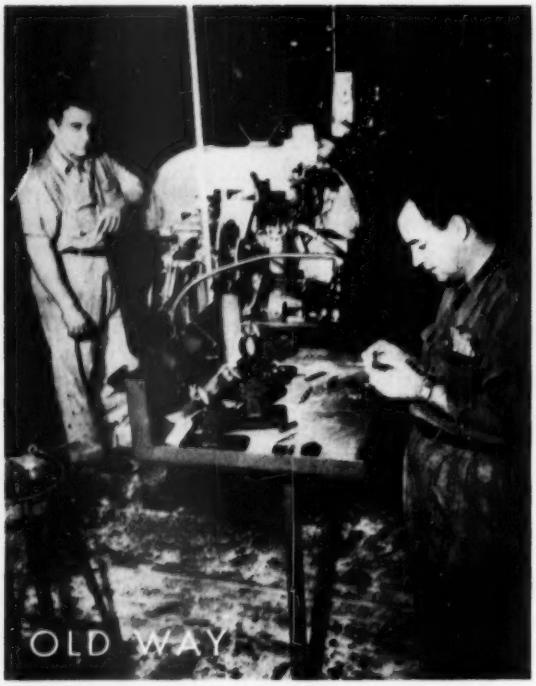
To be most useful, these hourly research men must understand the science principles involved in the work being done by their groups. There are four hourly research classifications, beginning with laboratory helper. To be promoted from one to another, the hourly employee must spend a specified minimum amount of time on his present job, be recommended for promotion, and pass an examination administered by the educational department. For the past eight years, there have been an average of 20 examinations each 3-month period.

3. SALES TRAINING • Our sales representatives must have a comprehensive knowledge of the company's organization, products, and sales operations. Rapid growth has necessitated many additions of young, technically trained men—as is true of other aspects of our business. This in turn has made training an increasingly important task.

Since early 1949 substantially all new salesmen go through a 26-week training program, covering virtually every phase of the company's operations.

This program includes full-time work experience in the sales department, the maintenance shops, chemical production, and research and technical service departments.

Of greatest interest, perhaps, from a plant operating viewpoint is the fact that plant people—workers and supervisors alike—have readily grasped the meaning and importance of this sales training. There is a stronger sense of common interest between plant functions and sales functions as a result. This cooperation has been the key to the program's success.



TRAVELING INSPECTORS at Standard Pressed Steel used to check product quality at the machines. Now SPS capitalizes on a good machine operator's pride in his work by having . . .

QUALITY-CONSCIOUS OPERATORS, who know most about the products they make, inspect their own work. On one line, these operators cut product rejects by more than 95%.

The switch from old-fashioned product inspection to modern quality control...

Cuts Rejects and Inspection Cost

By JOHN M. SHERMAN • General Foreman in Charge of Quality Control, Standard Pressed Steel Company, Jenkintown, Pa.

FOUR YEARS AGO we launched a program at Standard Pressed Steel Company to raise the quality of our fasteners. We changed from an inspection system to quality control which . . .

- **Cut in-process rejects—on one product, more than 95%.**
- **Reduced the requirement for inspection-quality personnel to less than half of what we would have needed at current production levels.**

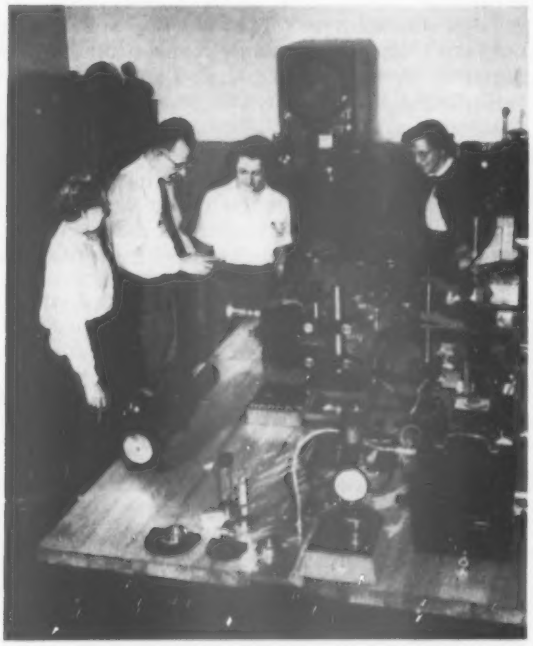
The products of our fastener division—such as socket head cap and set screws, and locknuts—must be the tightest interchangeable fit—class 3. So we had the best in conventional inspection techniques. We checked the product at each machine, at inspection benches at several stages of processing, and when completed. But too many pieces wound up rejected.

Changing over to quality control, we . . .

- Switched inspection emphasis to the materials, tools, and machinery that go into the making of the products.
- Made machine operators responsible for the quality of their work.
- Revised our methods of tool and gage control.
- Nearly eliminated in-process machine and bench inspection.

SPS SWITCHED QUALITY EMPHASIS from product inspection to closer control of the materials that go into the product. Here all bar stock is checked through magnetic analyzers. Inspection procedure also includes thorough sampling of materials for chemical, physical, and dimensional flaws, as well as magnetic particle and fluorescent penetrant tests.

SPS MAKES ITS OWN TOOLS to get precision machining needed for high-quality fasteners. Here a toolmaker turns out screw-forming die on duplicating lathe equipped with air gage tracer. SPS couples precision toolmaking with close inspection of all cutting tools before they go to production.



NEW CONCEPT IN GAGING. These people in gage center check working masters. At 16 local stations on production floors, quality control people use these working masters to check production gages before releasing them to operators. Gages in use are rechecked at least every 8 hours.

For details of quality control program, turn the page ▶

How We Organized for Quality Control

Begins on page 138

We started our quality control department with a small new group that became the nucleus of the organization as it grew. While growing it absorbed more and more of the responsibility for planning and effecting quality control. Of the present force, about 25% came from the old inspection department, the rest from production. [Author Sherman used to be a night foreman of automatic screw machines. He got his present job because he voluntarily initiated quality improvement in his department. Then he attended special courses to learn more about quality control.—*Editor.*]

The quality control program began with two assumptions:

1. We couldn't inspect quality into the product.
2. The more quality-conscious our operators, the better our product quality.

THE GOAL • We concentrated first on one type of product. Our goal was mass production of high-precision fasteners with a 2% limit on defectives.

We isolated a group of our best machines, put them into tip-top shape, then selected our best operators to run them. We controlled the material going into these machines. When we ran a series of control charts on the output of this machine group, we could prove that our goal of less than 2% in-process defects could be maintained.

Then we began to recondition the rest of our machine tools—rebuilt some, replaced others, and retooled. We began to roll instead of cut our screw threads and got a tremendous boost in quality.

DEPUTY INSPECTORS • At the same time, our operators were being trained as deputy inspectors. We showed them how and when to gage and to maintain simple frequency-distribution control charts. We taught them how to interpret gage readings and out-of-limit conditions on the charts.

We used control charts frequently on all machines at the beginning, then less and less as quality improved. At present, charts are optional for operators unless they're really having trouble.

Fortunately, our incentive standards already included allowances for operator-checking of product quality, so no changes were required. Anyway, operators on incentive were not the worst quality performers.

As the machine operators improved output quality, we cut down on in-process inspection. Inspection at the machine was discontinued first. Then we gradually got away from in-process bench inspection.

SHIFT IN EMPHASIS • At the same time we were giving more attention to material inspection. From no receiving inspection, we built towards thorough inspection of materials and tools. The shift in emphasis was to inspection *before* processing.

We worked on our tooling, too—aiming at an integrated tool department capable of manufacturing the tools required to maintain consistently high dimensional quality. Now we Magnaflux and run hardness tests on all our machine cutting tools before releasing them to production.

NEW GAGING TECHNIQUES • Our thinking on gaging was completely reoriented, our gaging techniques revised. Formerly, one man checked all our gages; now 22 people find it a full-time job. We now have half a million dollars' worth of gages out on the production floor. Each variable-type gage in use is checked at least every eight hours.

The company changed organization, too. Fastener manufacturing had been organized on a functional basis—departmentalized by process. Now we have integrated operation on one product in one production area. The entire operation on a product is the responsibility of one production supervisor. This change improved quality, too.

Highlights of SPS Quality Control

SAMPLING BY OPERATORS • We added quality control to the operation, set-up, and maintenance training of operators. The quality control department helps production set up a training program, but production does the training. Instruction combines classroom and on-the-job training.

Each operator work station is equipped with a gage table. The gaging department sees that each operator is supplied with the gages he needs for his job. The operator samples his own product at the beginning of each run, at each set-up or tool change, and periodically during a run.

He knows how to interpret the results of his sampling. And nine times out of ten he can correct off-quality conditions without delay. If not, he notifies his production supervisor. If trouble still persists, the operator may run his own control charts to help analyze the trouble.

Each operator is directly responsible for the dimensions and surfaces on which he works. If he accepts a lot of fasteners with undersize bodies, then proceeds to thread these bodies, the quality defect becomes his responsibility. So the operator has to check the quality of the work he receives as well as the parts he turns out.

Defects may be reworked. But sometimes we have to scrap them and start a re-run. To begin a re-run, an order must be issued over the signa-

tures of the operator and foreman responsible for the defective work.

Many plant men may think that it's quality suicide to have the same man make and inspect a product. Most textbooks on plant organization insist on divorcing inspection from production. But we've found that our machine men are completely reliable—are doing even better than we had hoped.

MATERIAL CONTROL • We ask our suppliers to certify that materials will meet our specifications. Then we double-check that quality in the plant before releasing materials to the machines. It costs more this way, but we find it more than pays off.

We put all incoming materials through receiving inspection. We sample all materials for physical and chemical defects. We section and etch; we check hardness, dimensions, and visual flaws. We run samples through magnetic particle inspection or fluorescent penetration tests. We put all bar stock through a magnetic analyzer.

TOOL CONTROL • Insistence on rigid standards in our tool division solved many quality control problems at the machine. In fact, proper tooling proved so essential that we combined tool design, tool manufacture, and quality control in one department, under one manager.

Here, as with material, we thoroughly inspect tools before sending them into the shop. Tools in large quantities are checked on a sampling basis. Specials are inspected 100%. We Magnaflux all our cutters and test them for hardness, too.

We place added restrictions on tool specifications when ordering them from another manufacturer. Then we find out how and under what conditions they measure their tool sizes and duplicate these methods in our own receiving inspection. Usually when the supplier knows he's being checked, quality goes up. When we started to Magnaflux all cutters made outside, we found a 95% rejection in one lot due to cracks. By working closely with the manufacturer, we're both getting ahead faster.

GAGE CONTROL • Under the new system we have a master gage center that checks our working masters. In the machining areas, we have sixteen local gage centers where the working masters are used to check our inspection gages. The quality control people at these stations supply the operators with the gages they need, and check them at the machines at least once every eight hours.

We found our method of gaging inadequate, too. We traditionally checked screw threads on a go-no-go basis. The operator would know that the product was good or bad, nothing more. Now, using triple-roll gages modified to meet our special requirements, our machine operators measure lead, angle error, and pitch diameter in terms of increments of deviation from the standard. Knowing how much and in which direction the product is off, they can intelligently make corrections.

Thorough gaging has greatly improved machine output. We recognize this by spending one-fourth of our quality control budget on gaging. We're continually re-evaluating gaging techniques.

NEW MACHINES • Few machines at SPS are now older than 8 years; average age is less than five years. A 1953 machine tool will give us up to three times the production of its 1945 counterpart—and much higher quality. SPS policy of plowing 80% of earnings back into the company—for new machinery and new plant construction—has enabled machine performance to toe the high mark set by customer requirements and government specifications.

PROCESS CHANGES • Changes in method of manufacture—in some cases the addition of an operation—helped us achieve our goal.

In one department we added a grinding operation ahead of the automatic screw machines. We now grind our bar stock to size before feeding it to our threaders. By transferring this one operation to a more accurate machine, we have greatly increased the percentage of output that is within tolerance.

WORKING CONDITIONS • Quality perked up when we modernized plant lighting. Soundproofing 30% of our production space removed a physical obstacle to precision work.

We placed employee morale high on our list even before quality control came to SPS. The company has provided employee recreation facilities, ultra-modern employee locker rooms, and washroom and toilet facilities. We can't prove that quality goes up a notch with every additional stainless steel wash basin or new softball field. But we are convinced all these measures helped.

EMPLOYEE SELECTION • Counting as we do on the machine operator, we realize he must be properly selected and trained. At SPS we look on defects as accidents. Our workers will be prone to such accidents if they are not properly placed, or if they are not properly trained. We test all candidates—using approved aptitude and psychological tests—then give thorough on-the-job training.

REPORTS • We give management concise reports of equality statistics in fast-reading graph form:

1. Weekly report, by product groups, of rejection and scrap percentages. The 8½ x 11-in. form has space for over 6 months' data, including the figures and a graph that shows quality trend.

2. Weekly report, by product groups, of the reasons for, and relative frequency of, rejects.

3. Monthly and semi-annual report of quality statistics of purchased material, by vendors.

4. Annual report of material returned by customers, showing total value by departments responsible for the claims.

A tiny spark from a non-explosion-proof motor blew this plant to Kingdom Come. Let it remind you that...

Your Plant, Too, Could Go Boom!

You'll cut down the chances, though, if you'll learn what's hazardous and what's not—and where explosion-proof equipment is a *must*.

By J. W. ST. ANDRE, Electrical Editor

YOU WOULDN'T LET LIVE BOMBS LOOSE in your plant. Yet you may have hazards just as bad as bombs setting under your nose—and waiting for the moment when conditions are right. Just one tiny spark. Then BOOM! And your plant looks like this one.

"Can't happen in my plant," you're no doubt saying. "We don't manufacture anything that will explode. Why, we haven't had a fire in months."

Don't be too sure you're that safe.

FOR EXAMPLE · A Midwestern food plant developed a process for extracting oil from a vegetable with hexane—a volatile, flammable solvent. The extracting unit was located about 50 feet from the processing building. This was considered a safe distance. An ordinary control panel was mounted in a first-floor room of the building.

One day there was trouble at the extractor. An abnormal amount of hexane vapor escaped. Heavier than air, it crawled along the ground to a depth of two or three feet. The men could see it spread across the 50-ft. strip of ground and into the control room.

The trouble was corrected at the extractor, but,

in all the excitement, nobody gave a thought to the control room. An operator went in to start the process moving again. A spark from the motor starter ignited the vapor. A flame flashed back into the extractor. Gage glasses popped. And 1200 gallons of hexane spilled and burst into flames.

Two men were burned to death. Several were badly injured. The extracting unit was destroyed.

Cause: The starter was not explosion-proof. A small detail—but ignoring it led to a big tragedy.

Today those small details mean more than ever. Speeding up production methods may make seemingly innocent material more explosive than dynamite.

A spark is all that's needed to touch off flammable gases and vapors or combustible dusts in the right mixture with air or other gases. And the greatest source of sparks is your electrical equipment—light switches, pushbuttons, motor starters, and other electrical devices.

How to Spot Danger Zones

What are explosive conditions? Your best answer is the National Electrical Code. It defines hazards and classifies them by type and degree of danger.

First off, it tells you the three classes of hazardous locations:

Class I. Where the air contains or may contain enough flammable gases or vapors to produce explosive or ignitible mixtures (as in a refinery).

Class II. Where combustible dusts create hazards (as in a grain elevator or flour mill).

Class III. Where hazards are easily-ignitible fibers or flyings not suspended in the air in sufficient quantities to produce ignitible mixtures (textile plant).

The code also groups atmosphere mixtures with similar explosive characteristics. The groups are:

A. Atmospheres containing acetylene.

B. Hydrogen and equivalent gases, or vapors such as manufactured gas.

C. Ethyl or ether vapors.

D. Gasoline, petroleum, naphtha, alcohols, acetone, lacquer, solvent vapors, and natural gas.

E. Metal dust.

F. Carbon black, coal, or coke dust.

G. Grain dust.

GAS AND VAPOR HAZARDS • Any atmosphere is explosive if it contains enough gas or vapor to ignite. But you may not realize that a relatively low ratio can give you an explosive mixture.

Here's where gas or vapor may be storing up grief for you:

Spray booths, painting operations, and nearby areas; open vats or tanks of volatile, flammable liquids; drying rooms for evaporating flammable solvents; cleaning and dyeing plants using hazardous liquids; gas-generator rooms for heat treating and other processes; pump rooms handling flammable liquids; and areas where volatile solvents are used and where flammable, volatile liquids and liquefied, flammable gases are transferred from one container to another.

Many factors may enter the picture. They include temperature, barometric pressure, humidity, ventilation, processes used, and ratio of room volume to amount of liquid being vaporized.

Portable gas analyzers show, with reasonable accuracy, the percentage of gas or vapor in the air. But that's only at the time of measurement; factors can change. So depending on spot checking with an analyzer is apt to be dangerous.

DUST HAZARDS • Take the dust from almost any combustible material. Confine and ignite it. If it's fine enough, dry enough, and in sufficient concentration in the air, it'll explode.

What materials? These are typical: starch, grains, aluminum, cork, sulfur, magnesium, wood flour, synthetic resins, coal and coke, and spices and herbs. You can get a complete list from your insurance company or the National Fire Protection Association.

Dusts mean danger in storage and grain-handling plants. Watch out for them in rooms containing grinders, pulverizers, cleaners, graders, mixers, blenders, scales, packing machines, open conveyors or spouts—and, of course, dust collectors.

Dust can play you some nasty tricks. Coatings of the stuff may prevent the safe escape of heat from electrical equipment. The stifled equipment can then heat up to a point where the dust catches fire.

Also, some dusts conduct electricity. They seep into enclosures, forming deposits on insulating materials like panels. If the deposits are large enough, you'll get short circuits on contactors, switch blades, and bus bars. Result: An explosion in the enclosure, which may touch off a bigger blast.

The Answer: Explosion-Proof Equipment

You check your plant, spot some hazards, and put in some explosion-proof devices. Is everything lovely? Not necessarily. Different hazards often require different safety equipment. So you have to fit your equipment to the situation.

Here's where you get a helping hand from Underwriters' Laboratories, Inc. It runs exhaustive tests on explosion-proof devices and lists them according to the particular atmosphere they're designed to work in. Then each device is tagged so you can identify it. For example, a tag may read: "Approved for use in Class I, Group D locations." It means just that—nothing more.

Limited uses are especially characteristic of Class II (dust) areas. Many Class I (gas and vapor) devices overheat when blanketed with dust in a Class II location. And consider ignition temperature: It's considerably lower for grain (Class II) than for gasoline (Class I). Of course, some de-

vices suit all three classes. If so, they'll be tagged accordingly.

What are general requirements for explosion-proof equipment?

FOR DUST HAZARDS · Here your apparatus is safe if it's dust-tight, to prevent internal explosions. Dust particles are large enough to be kept out by seals that don't cost a small fortune.

FOR GAS AND VAPOR HAZARDS · Don't expect your equipment to be gas-tight. It's almost impossible to exclude gas and vapor—seals to do the trick cost too much. What's more, every time you open the equipment for maintenance and repair, explosive mixtures float into the enclosure.

So here the idea is to have a casing capable of withstanding an internal explosion. When there's such an explosion, the casing should confine sparks and flashes; if they escape, they'll ignite outside gas and vapor.

Maybe you think explosion-proof devices have too many bolts and nuts for securing case assemblies and covers. It's not so. They're all needed. Leave off just one, and you're flirting with danger.

Hazardous and Not So Hazardous

"But," you may chip in, "explosion-proof equipment is expensive and sometimes hard to get. In our installations, no gas, vapor, or dust can get out of piping, kettles, and tanks. Why spend all that extra money when there's no apparent danger?"

The National Electrical Code permits certain conditions to give you relief from high installation costs. The code divides hazards into two divisions.

Division 1 locations are considered "normally and frequently hazardous." They're the ones we've been talking about up to now.

Division 2 locations are classified as "abnormally and infrequently hazardous." In Division 2 only the normal-arcing parts of electrical equipment must be in explosion-proof housings. Squirrel-cage motors, electrical solenoid valves, junction boxes, etc., needn't be explosion-proof. You can use an electrical device that normally doesn't produce sparks. But open contactors, pushbuttons, and limit switches must be suitable for hazardous areas.

To qualify for Division 2 rating, your areas must meet these conditions:

1. Hazardous gases, vapors, or dusts should be confined in closed containers.
2. Hazardous concentrations of gases, vapors, or dusts should be prevented by positive mechanical ventilation.

Your local inspector or insurance company representative can probably tell you whether your hazardous locations are up to Division 2 standards.

Needless to add, there's an obvious way around hazards—simply locate your electrical equipment outside hazardous areas. Then you're safe with standard electrical devices. Just be sure you have proper seals between hazardous and non-hazardous locations.

All locations—hazardous or not—call for close observation. If you're in doubt about them, you'll be smart to stick to the rules for hazardous operations. Even so-called non-hazardous areas are sometimes not so non-hazardous.

FOR EXAMPLE · A plant had a building where aircraft engine carburetors were tested. Tests required high-voltage switchgear, which, in explosion-proof models, runs into a lot of money. So all switchgear was isolated in a separate basement room with 2-ft.-thick concrete walls and ceiling and no openings to the hazardous testing area.

All equipment in the hazardous areas was 100% explosion-proof. Emergency buttons were scattered through these areas to cut off all power in case of trouble with the gasoline supply or testing equipment. It was a safe building—safe, that is, for a couple of years.

Then along came new testing methods. They called for enlarging the testing area and installing more equipment. They also required a new power supply. So the electricians drilled a hole through the floor into the switchgear room in the basement.

Plumbers were tying in new equipment, when a 2-in. pipeline began spouting high-test gasoline. Construction men and testers fled the building. On the way a tester pushed an emergency button, cutting off all power—with one exception: a small exhaust fan that ran continuously to rid the hazardous area of gas fumes. Power for the fan motor was automatically switched from the normal supply to an emergency supply.

Meanwhile, gasoline had spilled and trickled down the hole into the switchgear room. There the atmosphere, now ripe for an explosion, was set off by a spark when the transfer switch operated.

The walls withstood the blast. But burning gasoline turned 15 inches of concrete into powder. Two men were caught in the switchgear room and badly burned. Testing was shut down for several days. Damage came to hundreds of thousands of dollars.

Why? The biggest mistake was cutting a hole into the switchgear room while testing was going on. Operations should have been stopped until the hole was cut and a conduit sleeve installed, cemented, and capped. But it would have been even safer to make the opening through the outside wall of the testing area from the outside wall of the switchgear room.

Following the rules for hazardous locations is not enough. If your plant has danger zones, double-check all construction activities, especially those near the hazards. Otherwise you may be living on borrowed time.

FOR REAL HELP TO SMALL BUSINESS

It is ironic that one of the first jobs of the Eisenhower administration, so widely, and erroneously, tagged as a "big business" administration, must be to go to the relief of small business. This is necessary because the preceding administration, while continually proclaiming its tender regard for small business, actually impaired gravely the ability of small business to carry on successfully. This it did in the necessary haste of devising an emergency tax program to finance rearmament and the Korean War. Now the new administration must revise this tax structure to give small business a chance to make its key contribution to an expanding American economy.

How Taxes Hurt Small Business

Since the outbreak of the Korean War, small business has been handicapped by two principal features of the emergency tax program:

1) Many small firms are unable to retain enough of their earnings to provide for expansion because these earnings are drastically limited by the excess profits tax.

2) Small companies have received a very small share of the tax concessions allowed by the federal government to encourage construction of defense facilities.

A small business that succeeds and hence grows is particularly hard hit by the excess profits tax. That tax, of course, applies to corporations having a net income of more than $25,000 per year. It results in taking up to 82 cents on every dollar of profit that the company earns above what is called an "excess profits credit." For most small companies the credit depends on what was earned in 1946-49. This creates an element of gamble and discrimination in determining the amount of tax to be paid. Time has proved that it is impossible to select a base period for the tax that is fair to all companies. A young company starting in 1946-49 is peculiarly vulnerable, as its earnings in that period were necessarily low. Even on modest earnings today, it would pay a high excess profits tax.

It is true that Congress wrote into the excess profits tax law provisions to lessen the impact of the tax on growing companies. However, none of these provisions in practice has given much relief to small business.

"Relief" Provisions Give Little Relief

Small firms rely almost entirely on retained earnings to provide funds for improving their plants and equipment. They get very little help from the provisions (1) that no more than 70 per cent of total profits can be taxed away, (2) that additional earnings are allowed on an increase of invested capital or (3) that growing companies are allowed a

rate of return on capital equal to the industry average.

Most large firms can obtain additional funds in the securities market. But small firms find it difficult to increase their capital by selling securities, since investors generally prefer the stocks or bonds of nationally known and seasoned companies. Few small companies, therefore, can reduce their tax burdens by increasing their invested capital, and few can meet their needs for equity capital if their rates of profit are no higher than those of the leading companies which generally set the average profit.

Small business has been equally at a disadvantage in the matter of accelerated depreciation for tax purposes. The government has encouraged a great expansion of our industrial plant, despite the very high rate of taxation on corporate earnings, by granting certificates of accelerated amortization on new plants built to support the defense program. These certificates allow business to charge off the cost of defense plants at a rapid rate. This decreases the earnings that are subject to taxes, and so increases the part of the earnings that may be retained in the business.

Growth is Stifled

But most of these tax concessions have been made to large firms especially equipped to handle the complex problems of defense production. Of the $12 billion of new facilities so far approved for fast amortization, only 11 per cent are for companies with less than 500 employees, although the share of such companies in the normal civilian business is about 30 per cent. In only 2 of 12 industries studied by the Small Defense Plants Administration were small firms receiving what was estimated to be a fair share of the total tax amortization awarded.

Because they are unable either to retain enough earnings after taxes or to step up their depreciation allowances, most small firms are unable to keep up in the race to expand and modernize plant capacity. The Small Defense Plants Administrator, in his report to Congress, emphasized that small companies have been unable to do their full part in the defense program for lack of capital.

The Council of State Chambers of Commerce recently published an eight-state survey showing widespread cutbacks of plans for new plants by small and medium-sized companies. According to this report, "high federal taxes enacted since the beginning of the Korean War appear to be placing an effective brake on the rate of industrial expansion in all the states surveyed and probably in the 48 states generally . . . It is principally the small and medium-sized companies whose growth is being stifled."

Some Ways to Help

The first step to relieve small companies should be to free them from the excess profits tax. The nation as a whole would be far better off if the excess profits tax were allowed to die as scheduled on June 30, since the tax promotes waste as it stifles incentives. It is quite possible, however, that the politics of tax reduction, as opposed to the economics, will prevent the elimination of the tax during 1953.

If the tax is extended, provision should be made for a much broader exemption to smaller corporations. If net income up to $100,000 a year, which in these days still constitutes small business, were exempted from the tax, the loss of revenue to the government would be about $175 million. This relatively small amount could easily be offset by an increase in employment and incomes if small business is freed from its financial strait jacket and allowed to expand. Careful attention should be given also to the possibilities of allowing a higher rate of return on the first $1 million of capital (roughly the amount it takes to provide 100 jobs) and of making special accelerated depreciation allowances to smaller firms. This is a matter so important that we shall return to it in a future editorial.

Relief for small business—relief from a financial paralysis that has kept it from playing its dynamic part as a growth element in our economy—would do much to give the lie to the notion that the Eisenhower administration is a "big business" operation. Much more important, it would be a long stride toward releasing the dynamic energies of many small businesses and businessmen to forward a continuing and expanding prosperity.

McGraw-Hill Publishing Company, Inc.

EVEN BEFORE THE PILOT RUN, Birtman engineers used predetermined time values to analyze the fixtures to be used in assembling a new product. Here they are working on the project in the company's work simplification lab.

PREDETERMINED TIME VALUES:

First Aid in Planning New Products

Analyzing their new product, using predetermined time values, helped Birtman engineers design the best assembly fixtures, speed operator training, spotlight mechanical difficulties before the job hit the shop, develop the best departmental layout, and determine the right production equipment.

By JAMES E. ALLEN • Coordinator of Work Simplification Program, Birtman Electric Company, Rock Island, Ill.

ONE OF OUR DEFENSE JOBS is manufacturing the tank-busting 3.5-in. super-bazooka. For some time we manufactured everything but the electrical firing mechanism; this mechanism was supplied to us by government arsenals. Later on we purchased it from various companies. Then, because of a shortage of the mechanisms, we bid on, and were awarded, a contract for a larger number of them. And with the contract we got problems:

• **The mechanism consists of some 70 parts to be assembled into nine subassemblies and one major assembly.** Most of the parts are small and hard to handle. The assemblies have to meet exacting requirements. It was an entirely new kind of work for us, even more delicate and more critical than our regular products—electric irons, vacuum cleaners, pump jacks, machinist and garage vises.

• **We had to meet a full assembly schedule in a short time.** And before the deadline we had to (1) design and build the fixtures that would be needed; (2) figure out how many fixtures, tools, and operators would be necessary; (3) iron out the inevitable bugs in the new assembly process; (4) plan the layout of work stations according to motion economy principles, and make the installations; and (5) train the operators.

Just a short time before we got the contract, I had attended a 3-week course in the application of predetermined time values. When I returned to the plant I passed on what I'd learned to our methods engineer, plant engineer, and five time study men. We'd just about finished these sessions when

the problem of setting up for the firing mechanism came along.

We decided to give our new tool a test. We found, even in this first try, that using predetermined time values is a better way to plan for a new product than our previous method, which depended on time studies.

HOW PREDETERMINED TIME VALUES HELP

1. We were able, using parts from the sample, to design, build, and de-bug all the assembly fixtures before we started even a pilot run of parts. Virtually no changes were made in the fixtures after the operators started on the job. With our former planning methods, we never knew whether we had the best possible fixture until the operator handled a trial run. Any necessary revisions in fixtures meant shutting down the job or the line, changing the fixture, and then retraining the operator. We used to allow a tooling delay of about two weeks to redesign fixtures after a trial run.

2. Training the operators on the new job was much easier because of our predetermined time value analysis. Probably the biggest improvement over our old methods came here. Because of our analysis, we had a detailed method sheet and a time for the job established before the operator ever saw it.

With our old time study methods, the methods engineer, the foreman, and the time study man all had a hand in confusing the operator. First the methods engineer would work with the operator while designing and changing the fixtures. When he felt he had a good set-up, he turned it over to the foreman, who added his suggestions and changes. Then the time study man would time and retime, and suggest changes in the method and fixture. And, of course, the operator's output was low throughout this period.

3. We were able definitely to establish the number of workplaces, fixtures, and operators we'd need before the job hit the shop. We knew what operator speed—and, therefore, how much production from each operator—we might reasonably expect. Formerly, with only a guesstimate on time (you can't time study a job until it's actually being performed), our layout engineer could only make a guess at how many workplaces he'd need. He used to make space available, and as things progressed, he would install benches, equipment, etc. The temporary installations often took nearly as long to make as permanent ones, and often were changed several times before we were through.

4. Finally, using predetermined time values enabled us to spot mechanical difficulties almost instantly, as well as any trouble the operator might have with the method. Because we had a complete analysis of every assembly operation before it entered the shop, we knew what time to expect of the operator. If the operator couldn't meet this time, we knew there was some kind of trouble, and could hunt for it.

HOW THE SYSTEM WORKS

As mentioned earlier, there were eight of us to work on the problem—five time study men, a methods man, a layout man, and myself. We split up into pairs. Each two men took one of the subassemblies. It was the job of each 2-man group, with the help of the methods engineer, to decide how to assemble the parts and what tools and fixtures to use, and to establish the method and the predetermined time for the job.

To help you visualize the process, let's follow an actual subassembly, the safety switch of the firing mechanism. A photograph on the opposite page shows the five parts and a finished subassembly.

Basically, this job consists of putting the tubular rivet through the safety button, the handle, the spring, and the detent—and then heading the rivet. The heading could be done four ways—by hand, by arbor press, by a small punch press, or by an air cylinder.

The decision was easy. No use doing a thing by hand if a machine can do it—and that eliminated the first two possibilities. A punch press operation carries a higher job grade than an air cylinder operation—so it was obvious that the best tool was an air cylinder, if it would do the job.

There were two possible methods of assembling the parts: (1) place the detent down, put on top of the detent the spring, then the handle and the safety button, in that order; then drop the rivet through all four parts and head it. Or, (2) put the rivet in a fixture, head down, and drop on (in order) the button, the handle, the spring, and the detent; then head the rivet.

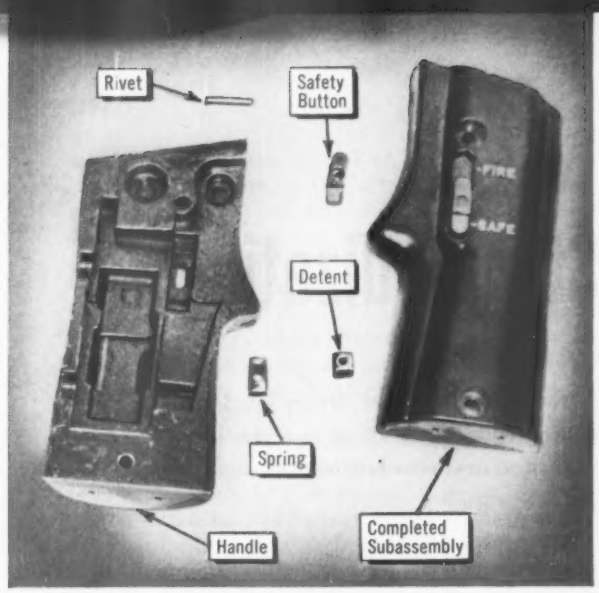
After playing with the parts in the work simplification lab, the group decided that the first method was better because it allowed compressing the spring before rolling the rivet. So we built a jig for this method, and set it up in the lab. While one man assembled the parts, the other wrote down the method, listing left- and right-hand motions, measuring distances moved, determining the classification of the motions, listing the correct symbols, and calculating the predetermined time for that motion.

But we found that passing the rivet in turn through button, handle, spring, and detent involved a lot of "jiggling," because the holes in the four pieces did not line up perfectly in the fixture.

We therefore decided, in spite of the fact that it is not normally good practice to rivet against spring pressure, to try the second method, in which the rivet is held in the fixture and the four parts are dropped over the rivet. So we built the second jig. It worked. And then we analyzed the predetermined time values of this method.

The second method proved to be about 20% faster. And we should add, in each case we tried different arrangements of the parts bins around the work space and got the time values for each.

So you can see that we developed the best jig in



THESE FIVE PARTS (left) could be put together two different ways to make the subassembly (right). Predetermined time values spotlighted problems, showed better way.

TRAINING OPERATORS was easier because detailed methods and job time were set in advance, using predetermined time value analysis. So there were no wrong methods to unlearn.

the laboratory, without the necessity of training an operator to operate the first jig, then time-studying that operation, revising the jig, retraining the operator, and doing a second time study. The photograph above, right, shows the workplace ultimately developed for this operation.

That's not all. Next time we can visualize two or more methods of doing the job, we'll work out the motion analysis of each method *on paper*, and then build the design that gives us the fastest time. In the case of the operation outlined above, we would have tried this, except that the problem of riveting against the pressure of the spring made it look as though the second method wouldn't work.

As soon as the method and time were established, several things were done:

1. The layout engineer calculated how many workplaces and fixtures were needed. Suppose we needed 320 subassemblies per day to meet the contract. If each subassembly took 15 minutes (per our predetermined time value), each operator could make 4 per hour, 32 per 8-hour day. And 320 pieces per day, divided by 32 per operator per day, gives us an answer of 10 operators (and, therefore, 10 workplaces and 10 fixtures). So he immediately made his layouts and installed benches and equipment.

2. The job was shown to the foreman involved, and he was trained or shown the motion sequence on each job. Just to satisfy himself that the motions were good, he made up right- and left-hand charts on some of the assemblies, using the *get*, *place*, *hold*, and *wait* symbols we had used for some time in our work simplification program.

3. As the jobs were set up out in the shop, one of the time study men took over the task of training the operators. As mentioned earlier, this job was made relatively easy by the methods analysis sheets we had made up in our studies. These include a left- and right-hand chart—a detailed instruction sheet, in effect. Once the operator was doing the job on his own, these sheets further served as a check sheet to make sure the operator was using the correct method.

4. Finally, the operations were time-studied for rate-setting purposes. This is company policy. As yet, we do not use predetermined time standards exclusively in setting rates. We use them only for methods analysis and checks. We noticed, however, that our time studies ran very close to the predetermined time values we had calculated. In fact, the over-all variance between the sum of the predetermined time values for all assembly operations and the sum of the time study times was only 2.8%.

Some of the variances are, of course, much higher—up to 14% in one case. When the jobs first hit the shop, the variances were still higher. Those facts point to another value of predetermined time standards. When you see a variance, it's a spotlight indicating one of two things—either the operator is having trouble performing the job, or there is some mechanical difficulty.

A case in point: On one of the assembly jobs, the predetermined time value totaled 0.402 minute. When the job first went to the shop, the operator took 1.50 minutes to do it. Red light! We worked with the operator on this job, and she finally got it down to 0.450 minute—which was the fastest speed we felt she should be called on to make.

The difference between this time and the predetermined time was caused, we found, by variations in some of the parts assembled—a mechanical difficulty. And we were able to attack this problem. Incidentally, the actual rate (for payroll purposes) on this job was set considerably above even the 0.450 time study time, due to allowances we give our operators.

Two case studies in . . .

Simplification and Standardization...

. . . which offer hope to companies with too much product diversification to think about a higher degree of automatic production. These two studies will give you a rough idea of what simplification and standardization might be doing for you and your company.

By MILTON LIPTON • Bureau of Labor Statistics, U.S. Department of Labor

ANY CONSIDERATION of American industrial development must come quickly to the principles of simplification and standardization in product design. The evolution of mass production was made possible by application of these principles; and these principles are being reaffirmed daily in the design, redesign, and improvement of our products.

American industry has been able to cater to all sorts of consumer preferences by offering a wide variety of products, models, and styles. But mass production and mass distribution are made possible by continuous attention to simplification — of product and methods — and standardization — of products, subassemblies, and components.

When the Mutual Security Agency undertook to help in the economic rehabilitation of Western Europe through a program of technical assistance, it provided among its services a study of simplification, standardization, and specialization in American industry by the U.S. Department of Labor's Bureau of Labor Statistics. Beyond reporting on the formal standardization activities of the American Standards Association, the American Society for Testing Materials, and individual trade bodies such as the National Electrical Manufacturers Association, the study draws upon the accumulated experience of individual firms. It highlights principles by reporting on practices and applications.

The electrical appliance industry was selected for several reasons. The industry is one in which costs can be held down only by assembly-line production on a relatively large scale. Yet it successfully markets a wide range of products and models. By last year, it is estimated that more than 35-million homes—87% of all homes with electrical service — were equipped with refrigerators; 30-million with washing machines; almost 24-million with vacuum cleaners.

These achievements in distribution were paralleled by a record of increasing productivity in factory operations. Between 1947 and 1950, as this table shows, man-hour requirements per unit of output were reduced about 15% for total factory labor.

The trend toward higher productivity is apparent since 1939. Only two years disrupt the progression — 1946, when conversion to civilian production was taking place, and 1949, when unit man-hour requirements for indirect labor shot up under the impact of a 20% decline in output.

Case Study in Standardization

An American refrigerator manufacturer reports on the standardization of compressor blocks, with savings of more than $150,000. The change in method that followed standardization also released 22 skilled machinists, a critical occupation, for assignment to defense production within the plant.

This example represents the experience of an appliance manufacturer, half of whose output consists of refrigerators and the remainder of freezers and refrigerator components, which it also sells to other manufacturers. Almost half of all its purchased materials consist of finished parts. These include motors, electrical controls, and preformed condenser tubing ready for installation.

The factory engineering department of this firm introduced a new method of producing compressor block castings, as a means of lowering manufacturing costs. Originally, two different castings were required to produce compressors of ⅛, 1/5, and ¼ horsepower. The ⅛- and 1/5-hp. compressors were each produced from the same-size casting. A 1-in. bore was used for each, with the difference in horsepower rating accomplished by varying the length of the piston stroke. The ¼-hp. compressor was made from a two-cylinder block with a 1-in. bore. Two different-size castings were necessary, therefore.

The redesign of the compressor block made it possible to obtain any one of the three horsepower ratings from a standard one-cylinder cast-

ing by varying the length of the piston stroke.

The introduction of the single-size casting was accompanied by the installation of a Greenlee automatic that replaced about 25 separate machining operations.

Cost savings were achieved through reduction in the variety of cylinder castings together with the change in machining method. The introduction of the specialized equipment was facilitated by the redesign and standardization of the compressor castings.

The greatest saving was in labor. It amounted to about $0.17 per unit; direct labor costs were reduced from $0.512 to $0.346. The change-over had resulted in a reduction in unit man-hour requirements by about half, from 0.3073 to 0.1599. The "labor burden" under the new method was estimated at 0.03 less per unit, in spite of the fact that it included $0.065 for amortization of the new equipment.

	Old method	New method	Change
Material	$1.6279	$1.5945	$–0.0334
Labor	.5121	.3456	– .1665
Labor burden	.5172	.4868	– .0304
Material burden	.1817	.1276	– .0541
Total	$2.8389	$2.5545	$–0.2844
Standard man-hours	0.3073	0.1599	–0.1474

Finally, extremely valuable floor space was released. The old machines had occupied 4800 square feet; the Greenlee required only 1200.

Case Study in Simplification

Simplification of design is illustrated in the change-over by another company from a cast-aluminum washing machine tub to one made of sheet aluminum. The research and development department originally authorized the change when restrictions were placed on the use of aluminum, following the outbreak of the Korean War.

The new construction was of two-piece design consisting of crown and tub, to be formed of aluminum sheets, milled, polished, and welded together. A shielded-arc process, using chemically inert argon gas, was specified for welding. Special fixtures were developed for close tolerances.

The new tub has a smoother surface with less porosity. It requires less polishing. Since the operations necessary to produce the new tub do not require as high skills as those necessary to produce the cast-aluminum tub, employees can be trained more easily. This can be of significance during a period when skilled labor is relatively scarce. Incidentally, in the course of field tests, the new tub was found to be more suitable for use with synthetic detergents than the old tub. This is attributed to the smoother surface.

The change was implemented when aluminum became a critical material. It made possible the saving of several pounds of aluminum per unit. Material costs rose, however, by $1.24 per unit because of the relatively higher price of sheet compared with pig aluminum. This was more than offset by a saving in labor of 1.17 hours per unit. At an average hourly rate of approximately $1.50, the saving in labor amounted to $1.75, and the net saving in direct labor and material was $0.51 per unit.

	Old method	New method	Cost decrease
Total	$14.84	$9.96	$4.93
Direct labor	2.57	0.82	1.75
Material	5.86	7.10	*1.24
Burden	6.40	2.04	4.37
Freight	†	†	.05

* Cost increase.

† Information not available; however, the company estimated the saving at $0.05.

In addition to other savings, the amount of factory space required was reduced by about 1000 square feet. Some 4000 square feet were saved by the elimination of grinding operations. Of this space, the new welding operations absorbed 2000 square feet. Another 1000 square feet were allocated for indoor storage of the tubs. The cast-aluminum tubs had formerly occupied 2000 square feet of outdoor storage which was no longer required.

Since it was first considered an alternate method of construction, it had been planned to build the new tub using existing tooling, including dies available at another plant. After public reception and cost savings had been proved, however, the company desided to invest in new tools and equipment, and to make all its tubs by this process.

About 20 pieces of special-purpose equipment were rendered obsolete by the redesign. These had a book value of $1000. The company purchased drawing presses valued at $150,000. It spent an additional $75,000 for special tooling and $35,000 for development work. Even though the new presses were to be used in the manufacture of other components as well, the capital expenditures were not small. Yet cost savings that stemmed from the simplification of design and methods more than justified the investment.

* * *

The examples presented here are in no way unique or even unusual. They are representative of the design changes introduced each year throughout the industry. Many of the changes are minor in conception and would seem to yield small results in savings. Yet, taken together, they contribute to the evolution of rational design and methods. Thus, simplification and standardization become techniques whereby factory operations can be adapted to the dynamics of production.

JOE'S DEPARTMENT

ELECTRICAL IDEAS EVERY PLANT MAN CAN USE

By JOE ST. ANDRE • Electrical Editor

Joe's-Eye View of the Maintenance Show

The Plant Maintenance Show, 1953 edition, has come and gone. They held it in Cleveland this year, and both show and conference—with more than 80 technical sessions—played to packed houses.

Too bad this year's show came at the same time as the AIEE mid-winter convention in New York. There were many sessions that proved of much interest to plant electrical engineers. There were also many interesting exhibits of new and improved equipment designed to help the plant electrical department operate more efficiently.

One whole session was devoted to electrical maintenance. Under the chairmanship of Jim Kimball, former electrical engineer and now building superintendent of Sperry Gyroscope Company, the session was kicked off by a talk by R. G. Edsall, works electrical engineer for the East Pittsburgh plant of Westinghouse.

The lively discussion period that followed broke up only when it was necessary to shoo everybody out of the meeting room so the building could be closed up for the night.

Much interest was shown in lighting maintenance, which is getting to be a good-sized headache to many maintenance departments. With lighting levels on the climb, I don't look for this headache to ease off right away. Both Kimball and Edsall have to operate large lighting installations in their own plants, so are very savvy guys on this subject. It was your tough luck if you missed them.

Another subject that came in for a lot of discussion was motor maintenance. Seems like electrical maintenance men are looking for some sort of formula that will give them the answers to such perennial questions as: How many motors can one man maintain? How often should motors be checked? And so on and on and on.

If there is any formula that will supersede experience and plain know-how operation data, nobody in Cleveland that night knew about it. As one of the men put it:

"The time to clean a motor is when it's dirty, and each man has got to make up his mind when that point is reached."

The real value of sessions like this one lies in the exchange of information—and I want to sound off about that. When you attend such meetings—and I mean any meetings, not just those at the Maintenance Show—jot down the problems you want answers to and bring them up from the floor. Don't be afraid somebody will think you're "dumb" if you get up on your feet and ask questions. The "dumb" ones are those that sit on their hands and then complain that the meeting didn't do much for them. So, come to the 1954 Maintenance Show next January—and come prepared to speak your piece. I'm thinking especially of the electrical sessions because they'll always be my first love. But the same thing goes for any of the other sessions.

Now just a word about a couple of exhibits that stopped me. One was a new sealing material that permits a commutator motor to run under water. Motor starters were repeatedly hosed down with water with no apparent effect. The compound seals insulation against water, acid solutions, sea water, fumes, and similar agents of destruction.

The thing is: Does the stuff really work? Well, one of my brewery friends uses it on motors that were continually giving him trouble on account of water splashing on them. You won't want to go overboard, though, because the compound sells right now at $192 a gallon. But for those really tough operating jobs, it looks like a real solution.

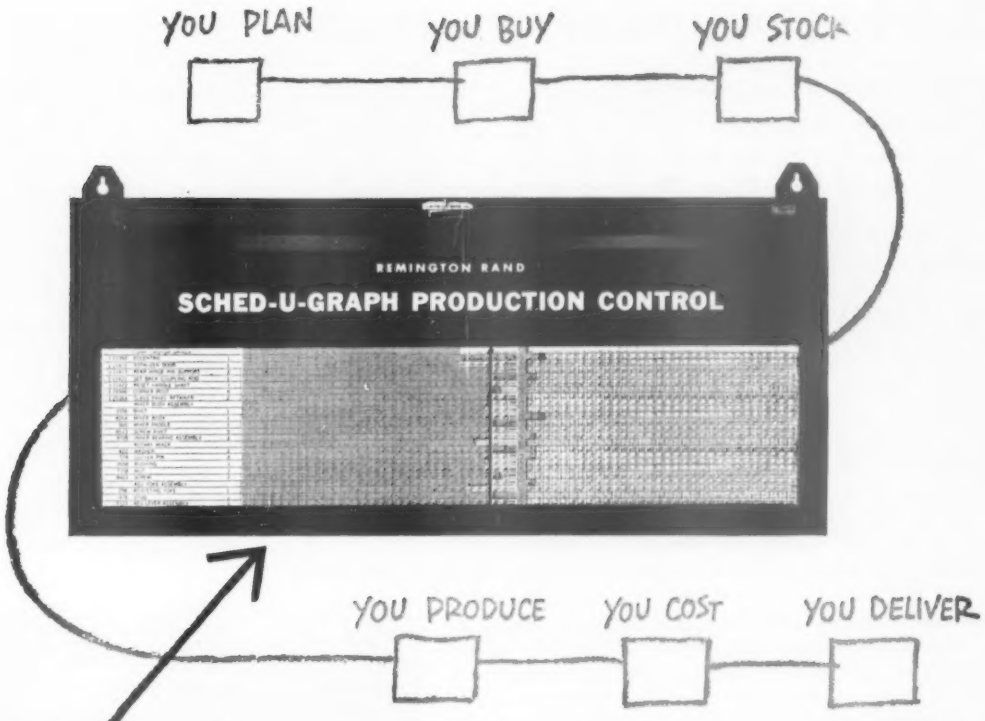
A tool manufacturer showed me a 36-inch pipe wrench that weighed only 2½ pounds. Made of an aluminum alloy with replaceable steel jaws, it will make all your electricians happy—especially when making up 4-inch conduit jobs.

Speaking of lightness, how about a portable pipe threader that only weighs 26 pounds, yet can handle from ¼-inch to 4-inch conduit? Or a hammer with a nylon head to drive those ball bearings? These hammers have "no bounce," yet can drive with the best of lead- or steel-headed hammers.

A lot of companies were showing powder-actuated fastening tools. These are the tools that "shoot" studs and other fastening devices into wood, concrete, and steel. Three or more fastenings a minute can thus be made.

These few items are but a small part of the things you missed seeing if you didn't attend the Maintenance Show. The show promises even bigger things in 1954. If I were you, I'd start working on the boss right away for permission to go. These shows have grown so big that only three cities—Cleveland, Philadelphia, and Chicago—have auditoriums big enough. It's Chicago's turn in 1954.

Turn to page 152



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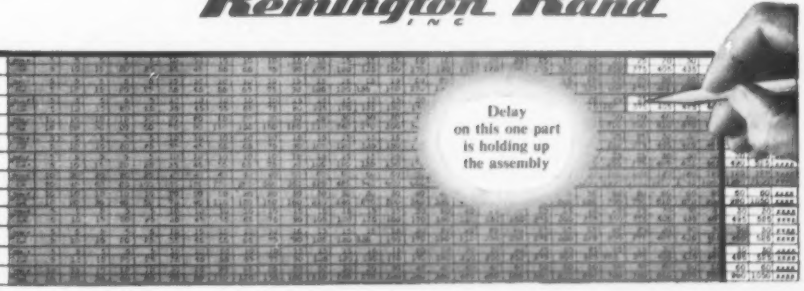
	MIXER BODY ASSEMBLY	
3356	RIVET	1
8264	MIXER BODY	1
865	MIXER PADDLE	1



JOE'S DEPARTMENT ... Begins on page 150

• HOW NOT TO GET TAPPED FOR TOP JOBS

The meeting I've just been talking about (see previous page) was packed. There were—if I may be permitted my usual two cents' worth of exaggeration—plant engineers hanging from the chandeliers. Right side up, of course.

But get a load of this: One of the sessions at the New Orleans Meetings of the American Institute of Electrical Engineers was devoted to management problems. One paper was on incentives. Another on good industrial relations.

Now comes the unbelievable! Out of more than 700 electrical engineers on the ground, only 20 bothered to attend this particular session. The rest were too busy rassling with technical problems at other group sessions.

I agree that technical problems are mighty important, but when less than one-third of 1% of electrical engineers at a meeting show an interest in management problems, it's time to think a little.

Maybe it explains why I find so few electrical engineers in top jobs. Today it's not enough to know all about volts and amps. The electrical engineer ought to be spending more and more of his time on problems for whose solution there are no known equations he can use. I mean problems dealing with other people.

It won't hurt designing engineers to know something about incentives in industry. It may influence them in their design of equipment. And engineers in operating jobs will soon be running up against incentives—if they haven't already.

Industrial relations are now a part of every engineer's activity. The amount of work one man can do without rubbing elbows with another is mighty little. Most of the electrical work you lay out means getting somebody to do the work itself. Union practices often have to be taken into account. The way instructions are given may become the difference between getting the job done right and failure.

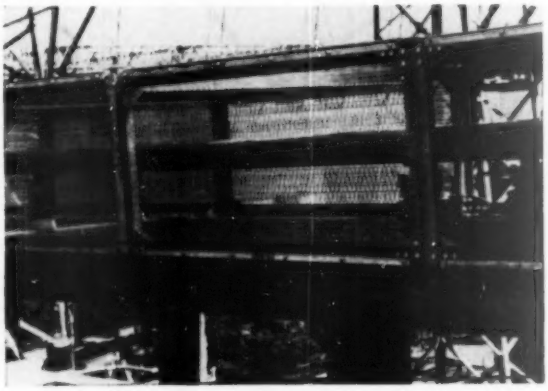
If electrical engineers are to get ahead in industry, they will have to demonstrate that they are capable of doing something besides electrical work. By attending and taking part in sessions devoted to managerial problems, you will not only expand your knowledge but will also show your top management you are getting ready to take on greater responsibilities.

• POWDER-ACTUATED TOOLS

Here's good news! The Joint Industry Board of the Electrical Industry of New York City has approved the use of powder-actuated fastening tools on all electrical jobs in the area. The Board, which is comprised of union leaders and contractors' representatives, stated that the use of these new tools will not only improve the efficiency of electrical workers, but also enable older workers to keep up with the others.

Drilling holes in metal or concrete, especially in cramped quarters, is a tough and laborious job. Sometimes it is necessary to pour fresh concrete and allow the bolts to set before they are secure. Under the new ruling, the job will be much easier. And panel boxes, conduit, cable hangers, and other fixtures that support wiring and devices can be hung from studs, pins, and screws driven by the powder-actuated tools.

I sure hope industrial plants will follow this good example and use these same tools in maintenance work. But when, as, and if your plant decides to try them, here's a tip: *Have the manufacturers show your workers how to use them.*



• BIRDS IN YOUR BUS

A bird in the hand is greatly to be preferred to two in a substation. So better be sure your electrical department checks the bus structures of your new substation periodically for birdnests.

Swallows especially have a hankering for building their nests among the insulators. Which would be OK—only one night mama swallow may come home, stretch her wings, and disappear in a burst of flame and a noise like a cannon shot. This is hard luck for mama—and rough on the little ones. But maybe even rougher on your electrical system. You may have a power outage and a shutdown.

Pigeons are a nuisance, too. They sit on the horn gaps on your high-tension switches. And, since they have a much wider wing span, they are that much more likely to set off the fireworks.

One company solved a similar problem by installing a housing for their outdoor buses made of expanded aluminum mesh. (See photo.) It drives the pigeons crazy. The swallows are unhappy. But it's sure saving power failures.

AT THE

GREATEST MATERIALS HANDLING SHOW

PHILADELPHIA, MAY 18th THROUGH 22nd, 1953

See CLARK EQUIPMENT *IN ACTION!*

- **NEW MODELS** — FORK TRUCKS, POWERIZED HAND TRUCKS, TOWING TRACTORS
- **FOUR POWER UNITS** — GAS, ELECTRIC, DIESEL, L. P. GAS
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- **See NEW CLARK MOVIE** — "SAFETY SAVES," DRIVER TRAINING AND SAFETY
- **And watch CLARK SERVICE in action!**

SEE THE SERVICE AND MAINTENANCE FACILITIES AVAILABLE TO EVERY CLARK USER!

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. . . they're the cream of this month's crop . . . They describe latest methods and equipment. Tell us which ones you want. Use the handy coupon at the bottom of the page. If somebody beat you to it, there's another on page 244.

MATERIALS HANDLING

1 Screw Conveyors, Feeders
Here's a comprehensive, 92-pager to help you select screw conveyors and screw feeders. Shows how you can use them to handle a wide variety of materials, gives engineering information, specs, and installation photographs. Book No. 2289. Link-Belt Co.

2 Conveyors, Pneumatic Tubes
Bulletin No. 68 shows conveyor installations and pneumatic tube systems in many types of manufacturing plants. Describes features and advantages, suggests applications. 16 pages. Standard Conveyor Co.

3 Industrial Elevators
In this 36-page catalog, you'll find the complete story on a line of portable and stationary elevators and portable cranes. Includes operating data and safety features. Specs and applications for each item in the line. Bulletin No. 5211. Barrett-Cravens Co.

4 Slings & Fittings
A 64-page catalog and handbook will help you select and use wire rope slings and fittings. Tells how to pick the proper equipment for any lifting job, lists sizes and capacities in maker's line. Index. Catalog No. FS-52. A. Leschen & Sons Rope Co.

5 Sling Chain
This sling-chain guide chart is designed to simplify selection from a line of sling chains and fittings. Besides identifying the various types of chain and their uses, the guide contains tips on how to care for the equipment. The McKay Co.

ELECTRICAL EQUIPMENT

6 Transformers
Here's a 102-page catalog on instrument transformers. You get ratings, accuracy classifications, and prices on indoor and outdoor potential and current transformers. Listings of test data, tables. Catalog No. GEA-4646F. General Electric Co.

7 Timing Relays
Selection and application information is feature of this 16-page catalog on timing relays. Operating features, specs, engineering and installation data are included. Allen-Bradley Co.

DUPLICATE COUPON ON PAGE 244

MAIL THIS COUPON FOR FREE CATALOGS *(Good until June 30, 1953)*

FACTORY MANAGEMENT & MAINTENANCE (April 1953)
330 W. 42nd St., New York 36

I'm circling the numbers of the catalogs and bulletins I want:

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14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45							

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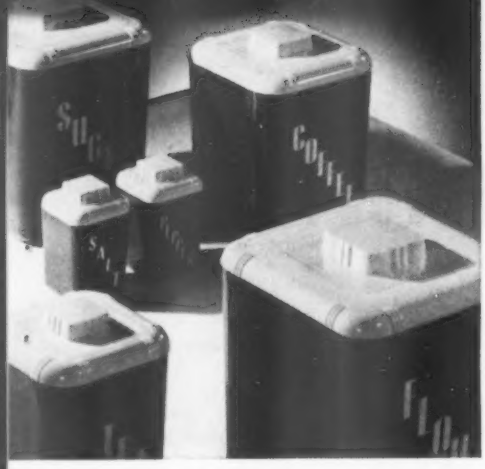
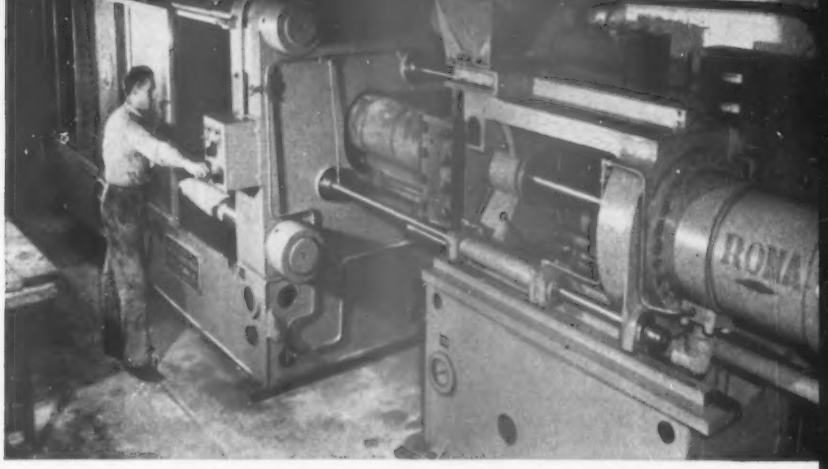
OTHER CATALOGS

PIPELINES & FITTINGS ..... page 238
MECHANICAL EQUIPMENT 240
AIR HANDLING 242
MISCELLANEOUS 244
PLANT ENGINEERING 246
PLANT OPERATING 250



NO MORE PROBLEMS. The production of plastic household items by Rona Plastic Corporation was slowed down by an inadequate hydraulic oil. A switch to Sunvis 999, over a year ago, restored it to normal.



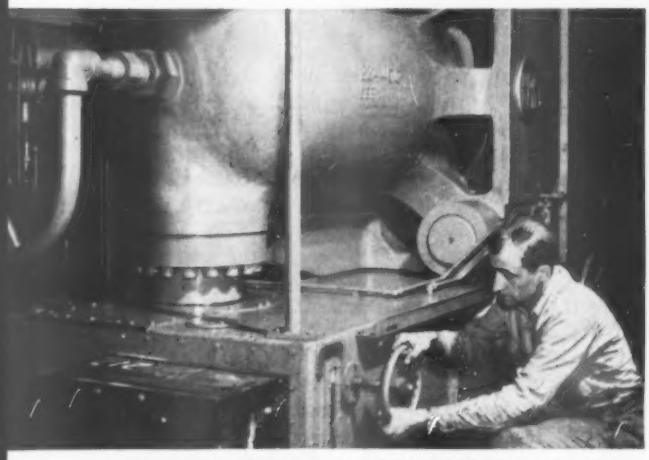
PRESSURE LOSSES ENDED. There are few plastic molding machines as big as this 60 ounce model. It exerts a pressure of 1,000 tons. Because the hydraulic oil formerly used sludged up and thinned out, it could not maintain this pressure. But Sunvis 999 has fully met these severe requirements, as well as those of Rona's nine other hydraulic machines of varying sizes.

PLASTIC MOLDER'S BOTTLENECK ENDED BY SUNVIS HYDRAULIC OIL

More than a year ago Rona Plastic Corporation, New York City, had trouble with its hydraulic molding machines. The machines functioned erratically due to oil sludge sticking the control mechanisms. In addition, the oil thinned out excessively at normal operating temperatures, and resulted in the loss of proper clamping pressures on the dies. To keep the machines going at all, it was necessary to drain, clean, and entirely recharge the systems at frequent intervals.

A Sun representative, called in by Rona, studied the problem and recommended Sunvis 999. He knew it would put an end to pressure losses, because, even at elevated temperatures, it does not decrease in viscosity as much as most other oils. He also knew its exceptional stability would end the sludging problem.

Sunvis 999 proved to be the answer to all Rona's hydraulic oil problems. The original charges, with minimum make-up, are still giving good service. Rona can expect the same performance for a long time to come, because experience shows that under normal operating conditions, Sunvis 900 Series Oils are *good for the life of the equipment.*



NO OIL CHANGES HAVE BEEN NEEDED. Before Sunvis 999 was adopted, the oil in each of the machines had to be changed frequently (the one pictured holds 450 gallons). The original charges of Sunvis 999 have been in use now for more than a year.

Department F-4
Sun Oil Company, Philadelphia 3, Pa.

I am interested in knowing more about Sun Hydraulic Oils. ☐ I would like to consult with a Sun representative. ☐ Send the booklet "Hydraulic Fundamentals and Industrial Hydraulic Oils."

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TECHNICAL ASSISTANCE AVAILABLE. Sun's engineers are at your service for consultation on all hydraulic oil applications. It will pay you to utilize the experience they have gained in solving a wide variety of problems in many different industries.

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MAINTENANCE POINTERS

FOR PLANT OPERATING EXECUTIVES

By CARL G. WYDER • Maintenance Editor

Designed primarily for radiant heating of homes . . .

. . . Flexible Heat Panel Is Pasted Up Like Wallpaper

Often a product designed for residential and commercial purposes finds some valuable application in an industrial plant.

We're wondering if this Type "T" Uscon electrical panel made by U. S. Rubber Company isn't such a product. It's a sheet of conductive rubber sandwiched between layers of thin plastic and aluminum foil. Total thickness is 1/16 inch. You may already have seen the rigid Type "B" which is ¼ inch thick.

Type "T" is rated at 22 watts per square foot (75 Btu.), available in 115 or 230 volts. Surface temperature averages 100 F. Three panel sizes are available: 4x6, 4x4, and 3x4 feet. You can paste up a panel in 12 minutes.

We Don't Need "Detailed Maintenance Costs"

If you really feel that way, this is for you. Here's a statement we think wraps up a whale of a case against the irreconcilables, die-hards, and doubting Thomases who scorn maintenance paper-work.

It comes from Harry Fohl, manager of the construction and maintenance division, Lukens Steel Company—the man who instigated the move for getting reliable data on maintenance costs at Lukens (FACTORY, March 1953, p. 113).

"Some time ago you asked me to tell you how I liked our new maintenance cost-control system.

"I'm completely sold on it—I wouldn't part with it. I know now that I can't run my department efficiently without it.

"Maintenance always used to be in the doghouse and on the defensive.

"Now things are really different. The cost control system has become watchdog over all the equipment for which I am responsible. It tells when it's time to ask for a replacement. It reveals whether or not the equipment is being abused. It generates everybody's confidence in the economics of our maintenance activities.

"We were afraid at first we might be swamped with paperwork. But we have less instead of more.

"Management can now see where its maintenance dollar is going. It knows, too, that it gets a better quality product at lowest production cost. As a result, maintenance has become a respected and valuable member of the organization."

Getting Workers to Treat Machinery With More Care

Several years ago J. H. Horstman, secretary of Robbins & Meyers, Inc., Springfield, Ohio, told us about some of the ways his company was improving the maintenance picture in his plant.

We pigeonholed one of his ideas because it was not germane at the time, yet too good to throw away. In these times of increasing high cost of equipment it seems quite appropriate to shake off the dust and spread out this idea on these pages. You'll see why when you read it. Said Horstmann:

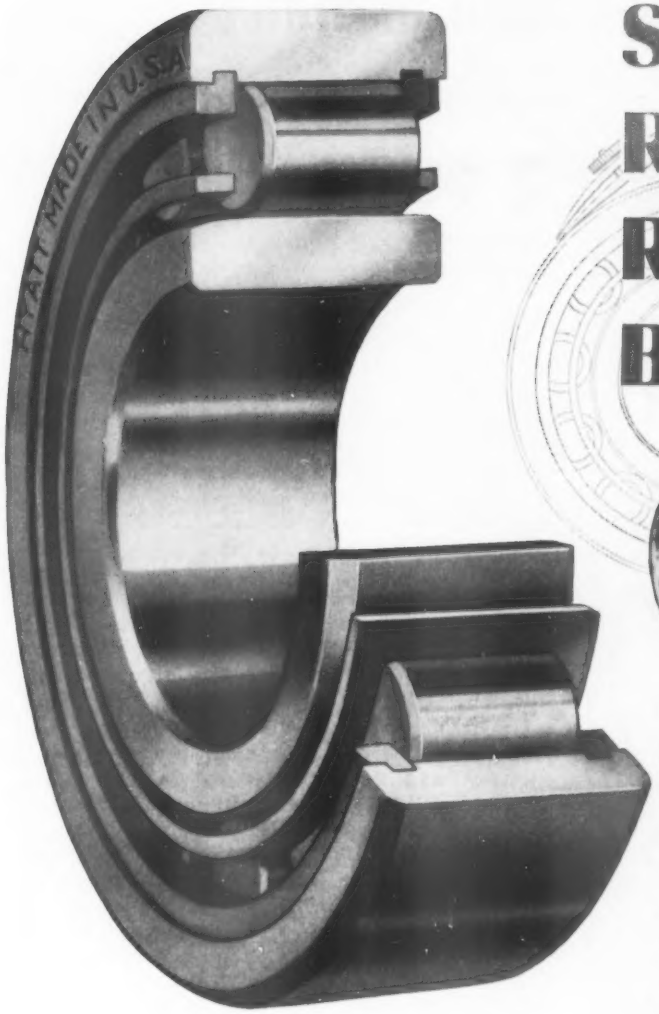
"It's a good policy to show the cost of each machine on a nameplate on the machine. This gives the operator an idea of the value of the machine he controls and operates. *Then he'll take better care of it.* It's surprising how few workers realize that the average industrial worker requires an $8000 investment. Many machine tools cost even more—$12,000 to $15,000 or higher. That sort of figure will make anybody stop and think."

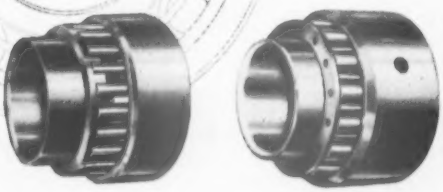
We can see other advantages in educating the worker on the economic facts of life. We know of one plant that hung a large placard over each machine, showing its cost, to press home the cost of doing business.

Turn to page 246 for good ways to solve special plant engineering problems

Answer to a LOADed question . . . the best way to handle radial loads is with . . .

HYATT STRAIGHT RADIAL ROLLER BEARINGS





Wherever the jobs . . . and the loads . . . are big, you'll find radial roller bearings smoothing the path of power, because radial roller bearings give the greatest load-carrying capacity within given boundary dimensions. And, whenever radial loads enter the picture, design engineers naturally turn to Hyatt for the most complete line of radial roller bearings available anywhere. The wide range of Hyatt Roller Bearing sizes and types allows the engineer greater design flexibility, makes his job easier. If you are not familiar with the complete Hyatt line, write for our general catalog No. 150. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.

HYATT ROLLER BEARINGS

maintenance data sheet

195

How to figure

Velocity and Friction Head of Water

in Plastic- and Rubber-Lined and Light Steel-Wall Pipelines

½-IN. PIPE		¾-IN. PIPE		1-IN. PIPE		1¼-IN. PIPE		1½-IN. PIPE		2-IN. PIPE		2½-IN. PIPE		3-IN. PIPE		4-IN. PIPE		5-IN. PIPE		6-IN. PIPE	
Cap. in Gpm.	Vel. in Fps.	Cap. in Gpm.	Frict. Head Ft.	Cap. in Gpm.	Vel. in Fps.	Cap. in Gpm.	Vel. in Fps.	Frict. Head Ft.	Cap. in Gpm.	Vel. in Fps.	Frict. Head Ft.	Cap. in Gpm.	Vel. in Fps.	Frict. Head Ft.	Cap. in Gpm.	Vel. in Fps.	Frict. Head Ft.	Cap. in Gpm.	Vel. in Fps.	Frict. Head Ft.	Cap. in Gpm.	Vel. in Fps.	Frict. Head Ft.
0.5	.53																						
1.0	1.06																						
2.0	2.11																						
3.0	3.17																						
4.0	4.23																						
5.0	5.28																						
6.0	6.34																						
7.0	7.39																						
8.0	8.45																						
9.0	9.51																						
10.	10.6																						
		14	8.43	25	9.30	30	6.43	23.5	50	7.88	28.5	90	8.61	25.1	100	6.70	12.8	140	6.08	8.32	400	10.1	15.5	600	9.62	10.9	650	7.22	5.17
		16	9.63	30	11.1	35	7.51	31.2	60	9.46	40.	100	9.56	30.5	120	8.04	18.	160	6.94	10.7	450	11.4	19.3	700	11.2	14.5	700	7.78	5.93
		18	10.8	35	13.0	40	8.58	40.	70	11.0	53.2	110	10.5	36.4	140	9.38	23.9	180	7.81	13.2	500	12.6	23.4	800	12.8	18.6	800	8.90	7.60
		20	12.0	40	14.9	50	10.7	60.4	80	12.6	68.1	120	11.5	42.7	160	10.7	30.7	200	8.68	16.1	550	13.9	27.9	900	14.4	23.1	900	10.0	9.44
				45	16.7	60	12.9	84.7	90	14.2	84.7	130	12.4	49.6	180	12.1	38.1	220	9.55	19.2	600	15.1	32.8	1000	16.0	28.1	1000	11.1	11.5
						70	15.0	114.	100	15.8	103.	140	13.4	56.9	200	13.4	46.3	240	10.4	22.6	650	16.4	38.0	1200	19.2	39.3	1200	13.3	16.1
						80	17.2	144.	120	18.9	144.	150	14.3	64.7	220	14.7	55.3	260	11.3	26.2	700	17.6	43.6	1400	22.4	52.3	1400	15.6	21.4
															240	16.1	66.4	280	12.2	30.	800	20.2	55.8	1600	25.6	66.9	1600	17.8	27.4
															260	17.4	75.3	300	13.0	34.1							1800	20.0	34.0

TABLE I—DATA ON FLOW OF WATER IN STEEL PIPE (STANDARD, SCHEDULE 40) • Friction head is given in feet of water per 100 feet of pipe. Velocity is given in feet per second.

ANYBODY WHO HAS TO INSTALL and use special-purpose pipe in plant service or process pipelines will have to calculate friction losses and pump heads.

Here's a quick way to calculate friction head in any such pipe system.

1. Find the friction head from Table I (at left) for standard-weight steel pipe for the given flow of water and nominal pipe size of the system.

2. Derive from Table II (next page) the equivalent value, in feet of straight pipe, of all fittings used. Add this value to the actual total length of pipe, thus giving the total effective length of the system in linear feet.

3. Pick off the correction factor for friction head from Table III (next page) for the type and nominal pipe size of special-purpose pipe you are using.

4. Multiply the total effective length obtained in item 2 by both the factors obtained in items 1 and 3, and divide the result by 100 (since unit of tabulation is per 100 feet). The result is your answer: friction head in feet of water.

Problem: What is the friction loss through a piping system having 300 feet of Saran-lined 2-in. schedule 40 steel pipe with two standard elbows and one globe valve, when carrying 50 gallons of water per minute?

Solution: In Table I, friction loss per hundred feet of 2-in. pipe at a rate of flow of 50 gpm. is 8.46 feet.

In Table II, fittings equal 68.4 feet of pipe. Therefore, effective length equals $300 + 68.4 = 368.4$ feet.

In Table III the factor for friction head for 2-in. Saran-lined steel pipe is 1.44. Therefore the friction loss is: $\frac{368.4 \times 8.46 \times 1.44}{100} = 44.88$ ft of water.

Now if you want velocity, pick off the velocity in feet per second for the given size of pipe and flow of water from Table I and multiply this by the velocity correction factor for the type and size of pipe as listed in Table III. The result is velocity of water, in feet per second, in the pipe system—in this case, $4.78 \times 1.50 = 7.17$ fps.

Source of Data. Data in Tables I and II are ab-

DOW CORNING SILICONES

make coils last longer

$25 invested in Class H Saves $500; makes city water supply more certain

Half of Philadelphia's water supply is handled through the Torresdale Raw Water Pumping Station by six 60,000,000 gallon per day centrifugal pumps driven by 2300 volt, 500 hp motors. These motors are controlled by oil filled circuit breakers. Trouble was that the circuit breaker coils had an average life of only 3 months; cost the taxpayers $50 every time a new coil was installed.

So to save taxpayers' money and secure more continuous and reliable operation of pumping equipment, department engineers had these coils rewound with Class H insulation at an additional cost of $25 per coil. That was 30 months ago. Not a single coil has failed to date, and that's already 10 times the average life of previous coils. Represents a saving of $500 per coil; a net saving so far of $3000 less the original investment of $150.00 in Class H or $2850.

That's the kind of performance and the brand of economics that has persuaded a steadily increasing number of engineers and top management men to specify Class H insulation made with Dow Corning Silicones. In thousands of applications from subminiature electronic circuits, through traction motors, generators and transformers to industrial motors ranging from 1/8 to 1000 hp, Class H insulation has given 10 to 100 times the life of comparable equipment built with the next best class of insulating materials.

Increase efficiency; cut production and maintenance costs; specify silicone (Class H) insulation.

***NOTE:** New Dow Corning Silicone Resins are now available to give you unequalled freedom in design—still more power per pound—even longer life and greater dependability. Write for data on the new Dow Corning 994 Varnish for coating; Dow Corning 997 Varnish for impregnating; and Dow Corning 2105 Resin for bonding.*

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DOW CORNING CORPORATION, Dept. L-4, Midland, Michigan

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- ☐ List of Class H Rewind Shops
- ☐ Data on Dow Corning 44 Grease for bearings
- ☐ Data on Dow Corning 994 Varnish
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FLOW OF WATER ... *Begins on page 158*

stracted from the Cameron Hydraulic Data Book, compiled by the Ingersoll-Rand Company.

Velocity data are based on the rule that velocity is inversely proportional to the pipe diameter squared. Friction-head data are based on the well-known Hazen-Williams formula for determination of friction losses in round pipe carrying water at 60F. By this formula friction head is said to be inversely proportional to the roughness coefficient *C* of the pipe raised to the 1.85 power, and to the pipe diameter raised to the 4.87 power.

In steel pipe, the value *C* is usually taken at 100, and this is the basis of Table I. But where the value of *C* is different, as in plastic-and rubber-lined pipe, no similar tables are available. Unless you have correction factors such as those in Table III, you have to resort to application of the Hazen-Williams formula. This involves complicated and tedious calculations for each type of pipe, pipe size, and rate of flow.

The data in Table III were prepared by Stanley Lenox, project engineer, The Permutit Company. These correction factors will apply to any kind of pipe that has the same inside diameter and same roughness coefficient. They also hold for any liquid having the same viscosity as water.

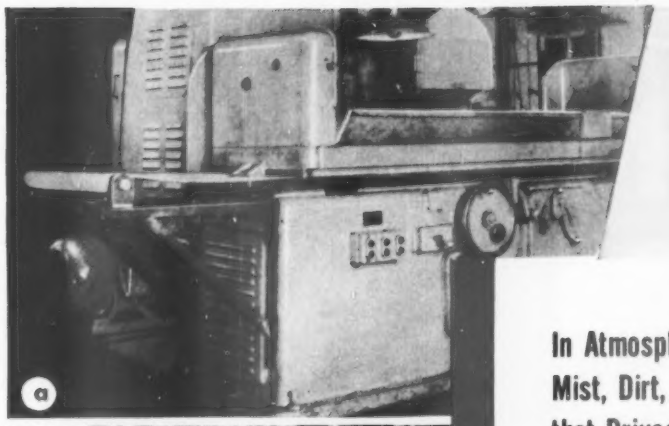
These data are not applicable for pipelines having other *C* values, or where fluids of other viscosities are used. In such cases you need to consult comprehensive manuals for more specific tabulations similar to Table I, and work out the answer.

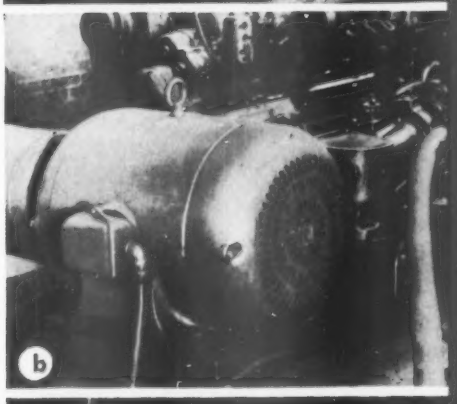
SIZE OF PIPE	Gate valve—full open	Globe valve—full open	Angle valve—full open	Standard elbows or run of tee reduced ½	Standard tee—through side outlet	Long-sweep elbow or run of standard tee
½"	.35	18.6	9.3	1.7	3.3	1.11
¾"	.44	23.1	11.5	2.1	4.2	1.4
1"	.56	29.4	14.7	2.6	5.3	1.8
1¼"	.74	38.6	19.3	3.5	7.0	2.3
1½"	.86	45.2	22.6	4.1	8.1	2.7
2"	1.10	58.	29.	5.2	10.4	3.5
2½"	1.32	69.	35.	6.2	12.4	4.2
3"	1.6	86.	43.	7.7	15.5	5.2
4"	2.1	113.	57.	10.2	20.3	6.8
5"	2.7	142.	71.	12.7	25.4	8.5
6"	3.2	170.	85.	15.3	31.	10.2

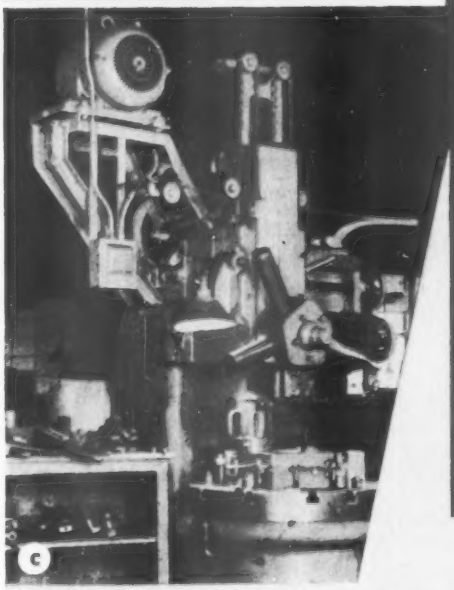
TABLE II—FRICTION LOSS IN PIPE FITTINGS • Each fitting is evaluated in terms of equivalent feet of straight pipe.

TYPE OF PIPE		NOMINAL PIPE SIZE, INCHES										
		½	¾	1	1¼	1½	2	2½	3	4	5	6
LIGHT-WALL STEEL Schedule 10 (C=100)	Velocity	0.853	0.872	0.916	0.916	0.919	0.922	0.881	0.883	0.892	0.906	0.910
	Friction Head	0.677	0.711	0.804	0.808	0.810	0.813	0.731	0.746	0.760	0.790	0.795
	I.D., inches	0.674	0.884	1.097	1.442	1.682	2.157	2.635	3.260	4.260	5.295	6.357
RUBBER-LINED Sch. 40 Steel (C=140) ⅛ in. linings for 4 in. and under 3/16 in. linings for 5 and 6 in	Velocity			1.72	1.49	1.41	1.30	1.24	1.19	1.14	1.17	1.14
	Friction Head			2.02	1.42	1.22	1.01	0.907	0.814	0.734	0.782	0.733
	I.D., inches			0.799	1.130	1.360	1.817	2.219	2.818	3.776	4.672	5.690
SARAN-LINED Sch. 40 Steel (C=140)	Velocity			2.33	1.68	1.44	1.50	1.31	1.24	1.23		1.23
	Friction Head			4.21	1.91	1.29	1.44	1.04	0.916	0.894		0.889
	I.D., inches			0.687	1.0625	1.344	1.687	2.156	2.750	3.625		5.469
USCOLITE U.S. Rubber Co. (C=140)	Velocity	1.29	1.23	1.20	1.17	1.15	1.13					
	Friction Head	1.01	0.895	0.842	0.779	0.759	0.733					
	I.D., inches	0.55	0.742	0.96	1.278	1.50	1.94					
SARAN OR PARIAN American Hard Rubber Co. (C=140)	Velocity	1.29	1.23	1.20	1.17	1.15	1.13	1.18	1.16	1.15		
	Friction Head	1.01	0.895	0.842	0.779	0.759	0.733	0.700	0.781	0.758		
	I.D., inches	0.546	0.742	0.957	1.278	1.500	1.939	2.277	2.842	3.749		
HARD RUBBER American Hard Rubber Co. (C=140)	Velocity	1.54	1.44	1.25	1.22	1.26	1.22	1.20	1.24	1.15	1.12	1.16
	Friction Head	1.55	1.30	0.932	0.870	0.933	0.863	0.847	0.916	0.758	0.721	0.776
	I.D., inches	0.500	0.687	0.937	1.250	1.437	1.875	2.250	2.750	3.750	4.750	5.625

TABLE III—CONVERSION FACTORS TO APPLY TO TABLE I • For flow of water in various types of special-purpose pipes.







In Atmospheres Containing Dust, Mist, Dirt, Fog... Protect the Power that Drives Your Production Machines

... Use Century

Totally Enclosed Fan Cooled Motors

In locations where the air is charged with substantial quantities of metallic or abrasive dusts, coolant mists or fog, or oil-laden factory dusts, Century Type TEFC Motors assure protection to help maintain uninterrupted production.

Because the vital parts of the motor are sealed in an inner frame, they are isolated from the outside atmosphere. A large fan blows cooling air between the inner and outer frames — keeps the motor temperature well within safe limits.

Wherever there are adverse atmospheric conditions, specify Century Totally Enclosed Fan Cooled motors, to give you the extra assurance that production will be maintained.

Other types and kinds of Century motors are built in sizes from 1/8 to 400 horsepower — designed to meet all popular industrial requirements.

CENTURY ELECTRIC COMPANY
1806 Pine Street, St. Louis 3, Missouri
Offices and Stock Points in Principal Cities

Century C MOTORS

(a) Surface grinder with Century 5 horsepower TEFC motor mounted near the floor.

(b) Century 15 horsepower TEFC motor operates in coolant fog from this grinder.

(c) Boring Mill with Century 5 horsepower TEFC motor.

ALTERNATING CURRENT MOTORS
POLYPHASE
Squirrel Cage Induction—1/2 to 400 H.P.
Wound Rotor Motors—1 to 400 H.P.
Synchronous Motors—20 to 150 H.P.

SINGLE PHASE
Split Phase Induction—1/8, 1/4, 1/3 H.P.
Capacitor—1/4 to 20 H.P.
Repulsion Start, Brush Lifting, Induction—1/2 to 20 H.P.

DIRECT CURRENT MOTORS
1/8 to 300 H.P.

GENERATORS
AC, .63 to 250 KVA
DC, .75 to 200 KW

GEAR MOTORS
1/8 to 1 1/2 H.P.

MOTOR GENERATOR SETS
AC to DC, AC to AC
DC to DC, DC to AC

Open Protected, Splash Proof, Totally Enclosed Fan Cooled, Explosion Proof.

CE-746

WHAT'S NEW IN EQUIPMENT

. . . BRIEFED HERE FOR THE CONVENIENCE OF PLANT OPERATING MEN IS INDUSTRIAL PLANT EQUIPMENT NOW ON THE MARKET . . .

AUXILIARY EQUIPMENT 164
ELECTRICAL EQUIPMENT 183
MAINTENANCE TOOLS & SUPPLIES . 188
MATERIALS HANDLING 192
MEASURING & CONTROL 200
PAINTS & PROTECTIVE COATINGS. . 204
PLANT HOUSEKEEPING & SANITATION
VALVES & FITTINGS 208
MISCELLANEOUS 216

IN THE NEXT ISSUE . . . Some notes on important late items. More about them next month.

Heavy-duty electric dehumidifier that is automatic and completely self-contained. Can be attached to existing floor drain.
Remington Corp., Auburn, N. Y.

Scrap baller especially designed for the handling of stringy scrap and wire. Will form a compact cylinder of scrap 22 inches long and 28 inches in diameter. Powered by electric motor.
Phillips Mine & Mill Supply Co., 2324 Jane St., Pittsburgh 3, Pa.

Free-rolling manual crane that features swiveling-type end trucks. These trucks not only insure alignment with track but also adjust to runway irregularities.
Abell-Howe Co., 53 W. Jackson Blvd., Chicago.

Portable air-driven stapling machine designed for heavy-duty carton-closing jobs. Can be used on containers that are not easily moved around.
Bostitch, 1008 Mechanic St., Westerly, R. I.

Automatic lubricator for conveyor trolley wheels. Eliminates stoppage for lubrication purposes.
Alemite Div., Stewart-Warner Corp., 1826 Diversey Pkwy, Chicago 14.

NARROW AISLES are no problem, and neither are . . .

HARD-TO-GET-AT BINS with Wilshire's new . . .

3-Way Maintainer

This may be the housekeeping machine your plant has been looking for. Gas-powered, it not only sweeps and vacuums floors but also has attachments for sucking up dust and blowing waste off machines. Changing from one function to another is easy.

Here are some of the advantages you get from a 3-Way Maintainer, according to the maker:

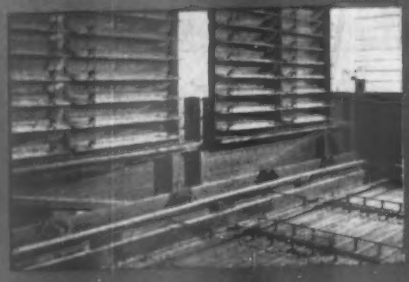
- Cleans floors from 6 to 15 times faster than a man with a broom. Dust is sifted from debris and collected in an air bag.
- Suction unit picks up anything from dust to metal chips. Different nozzle attachments permit cleaning out-of-the-way places.
- The blowing tool has enough pressure to clean chips, shavings, and dust from machines. Blow waste on floor then pick up with sweeper or suction hose.

Wilshire Power Sweeper Co., Glendale, Calif.

Parlon Stays On!

"...Parlon paint has protected our air conditioning against moisture, grease and dirt for over 10 years"

Below: Louver system of air-washing unit at Judson Mills and baffles in front of electric filter, which cleans air, are located in blending room. Both are given longer life with a protective coating of Rubalt RA paint based on Parlon. Here, this sturdy finish must withstand constant humidities of 96% at 51° F. In addition to excellent protection against corrosion, Parlon finishes resist mold and algae growth stimulated by the presence of yarn size in the atmosphere.



Giant fan units at Judson Mills, like that above, are now painted prior to installation, and at 18-month intervals, with Rubalt RA paint based on Parlon. This system protected violent fan, still in steady operation, for more than 10 years against all effects from corrosion.

In all air conditioning equipment, moisture poses a constant problem. In textile mills, add the grease, dirt, and other corrosive elements picked up in the system and it is easy to understand why parts rust out and need replacement after only a few years of use. Most paints, even though applied frequently, provide inadequate protection.

At Judson Mills, Greenville, S. C., where paint based on Hercules Parlon (chlorinated rubber) has been applied every 18 months, equipment remains in good operating condition 10 years after installation! Metal parts are still in excellent shape. Moreover, Parlon does not flake off and escape into the circulating system and contaminate valuable fabrics being loomed in the factory. For this reason, Judson now paints all of its new equipment with Parlon before installation.

Wherever corrosion is a problem, Parlon gives better service at lower long-term costs. See your paint supplier for details, or write

Cellulose Products Dept., HERCULES POWDER COMPANY 905 Market St., Wilmington 99, Del.

Parlon® CHLORINATED RUBBER PAINTS

AVAILABLE FROM 400 PAINT MANUFACTURERS UNDER THEIR OWN BRAND NAMES

New-type multi-purpose box

BOOSTS PRODUCTION CUTS COSTS!

Check these WORK-O-MATIC features!*

1. **WORK-O-MATIC DROP-BOTTOM BOX.** Exclusive Union Metal square corner box of heavy gauge corrugated steel, with outturned 1" triangular bead flanges at top and bottom.
2. **CORNER STACKING ANGLES.** Permit safe group stacking—one box on another—saving valuable floor space by putting air space to work. Designed to stop end or side shifting.
3. **HINGED CHUTE BOTTOM.** Lowering of operator-controlled truck forks hinges bottom downward, automatically sliding parts into work-level tray.
4. **HEAVY-DUTY WORK-POSITIONING STAND.** Receives box from back or sides. Is safely, easily transported by lift truck from one work station to another when desired.
5. **CONTROL GATE.** Vertical adjustment controls constant flow of different size parts to service the work station.
6. **WORK-LEVEL TRAY.** Feeds parts to work station eliminating costly, tiring, hazardous stretch-bend-stoop methods. *Reservoir feature* cuts "down time" during interchange of supply boxes.
7. **SLOPING TRAY END.** Assures maximum part accessibility. Easily removed during "job finish-off". Speeds job changes.

These are only a few Work-O-Matic features making as much as 52.8% production gains at thousands of work stations. Get all the facts by writing to The Union Metal Manufacturing Company, Canton 5, Ohio, for Folder MH-809 and T. & M. Studies.

*Patent No. 2,445,038. Other patents pending.

See this product at Booth No. 1106—Materials Handling Exposition—May 18-22, Philadelphia

UNION METAL
Materials Handling Equipment

Begins on page 162

AUXILIARY EQUIPMENT

Centrifugal Pump Offers Easy Impeller Adjustment

This pump, in addition to not needing any mechanical priming devices, introduces a simplified method of impeller adjustment.

Impeller is threaded on the shaft and is locked in position by an impeller adjustment screw. All you need do is remove the impeller cover plate to adjust impeller and case for wear. You then back off the impeller screw, turn the impeller into position by hand, and retighten the screw.

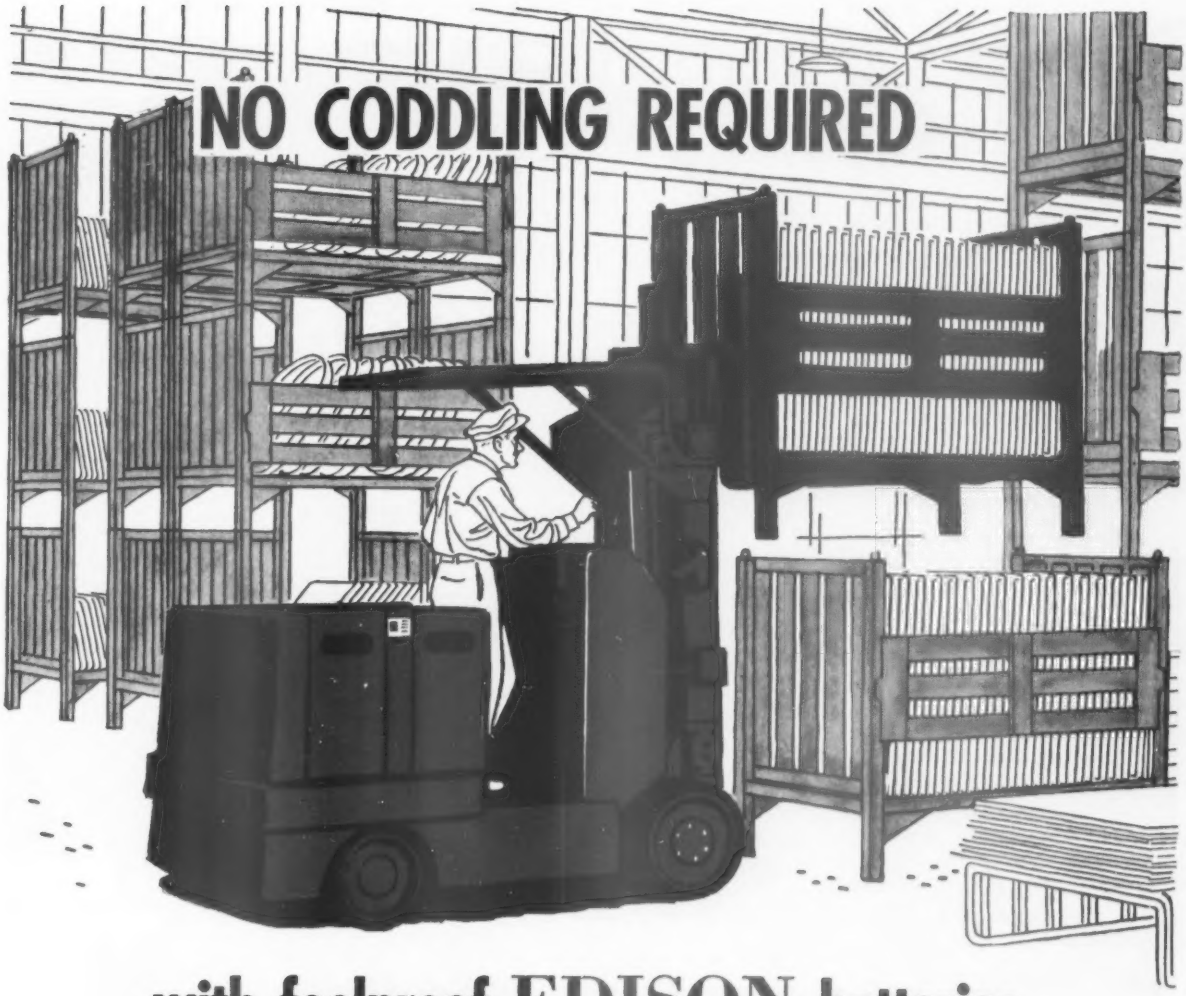
Much of the maintenance usually required on pumps has been eliminated by the simplicity of the construction. The impeller and the seal are the only two components that are located inside the volute case.

This pump, known as the Humdinger, can be driven by gasoline, diesel, or electric engine, or belt drive. It's light, compact, rugged, and built for continuous operation, the manufacturer says.

Made in a range of sizes from 1½ inches, pumping 5500 gph., to 10 inches, pumping 250,000 gph.

Ralph B. Carter Co., 197 Atlantic St., Hackensack, N. J.

Turn the page



with foolproof EDISON batteries

Long, trouble-free battery life, *without babying,* is a matter of record at the eastern plant of a large stove manufacturer. Truck-operation reports show no failure attributable to the EDISON batteries that power them.

A 24-hour accidental overcharge — obviously contrary to recommended practice — did not harm one of the batteries. After being watered to the proper level, it was in perfect condition, ready to go to work. Regular maintenance in this plant is simple—consists merely of proper watering, charging, occasional cleaning.

Fast boost-charges provide additional power. When temporary increase in plant production required maximum truck operations during two shifts, boost-charges during lunch hour provided the extra power needed until more batteries could be put in service.

For all 'round service — foolproof operation, dependable power, longer life, lower maintenance cost, less downtime—you can't beat an EDISON. Made of steel, it out-works, out-lasts other types of batteries. You can get the same kind of service on *your* job, by calling your Edison field engineer. He'll gladly give you complete information. Or send for Bulletins S.B. 2039 and S.B. 3808. Edison Storage Battery Division of Thomas A. Edison Incorporated, West Orange, N.J.

Most Dependable Power—

Lowest Over-All Cost

. . . you get both with an EDISON

EDISON

Nickel · Iron · Alkaline

STORAGE BATTERIES

TV Tube Maker puts Production Line in Distributor's Backyard

How CBS-Hytron found a new, economical way to improve service and reduce inventories

CBS-Hytron...a division of CBS, and one of the country's foremost producers of TV picture tubes . . . faced a twin problem. With demand pushing supply, how could they step up service to distributors and dealers throughout the country. And at the same time avoid costly warehousing.

In American Airfreight, they found the solution. Today, CBS-Hytron TV tubes are shipped by air in record time. Deliveries are fast. Distributors no longer need carry excessive inventories. Stocks are up-to-date. The right tube is at the right place at the right time. And this extra service costs CBS-Hytron distributors and dealers not a penny extra.

Here's another case where the money-saving results of airfreight more than offset its initial cost. Why not learn what this modern method of distribution can do for you?

For further information, wire us collect; American Airlines, Inc., Cargo Sales Division, 100 Park Avenue, New York 17, New York.

AMERICAN AIRLINES INC.

America's Leading Airline

NEW AUXILIARY EQUIPMENT

Begins on page 164

Lubricator Produces Uniform Oil Fog

You can produce a fine and uniform oil fog at low air flow with a Micro-Fog lubricator, the manufacturer claims. It is designed especially for the lubrication of bearings, spindles, gear boxes and small air-powered devices.

Made to fit ¼-in. air lines. Maximum safe operating pressure is 150 psi., top temperature 120 F. Air requirements range from 0.8 cfm. at 10 psi. to 6 cfm. at 80 psi.

C. A. Norgren Co., Englewood, Colo.

■

Integral-Shaft Sheave With Variable Pitch

Variable drive speeds can be obtained by varying the pitch of this new integral-shaft type motion-control sheave wherever an outboard bearing is employed. Designed for D-section V-belts, the sheave disks are assembled directly on a finished shaft.

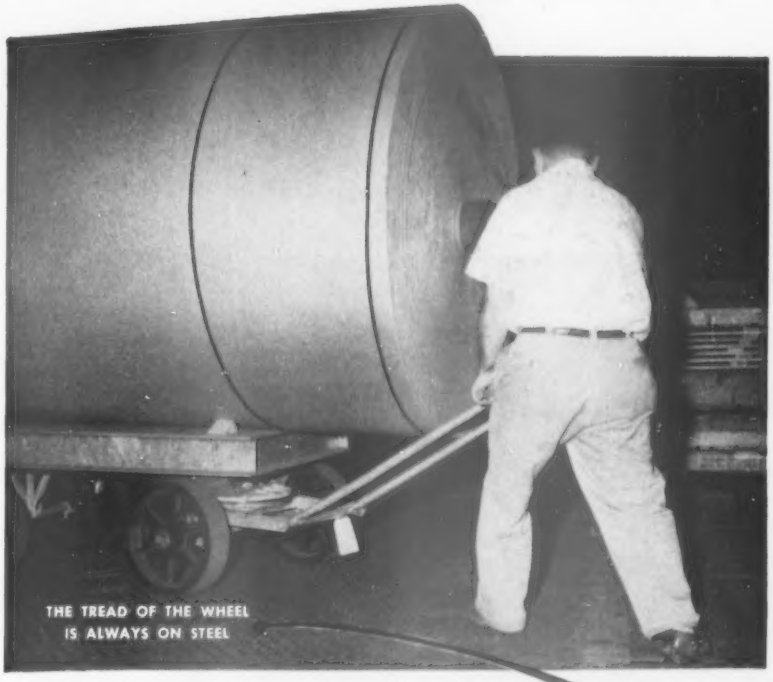
The "Vari-Pitch" sheave can be either manually controlled or remotely controlled by a pilot motor. Can be easily and quickly installed or replaced, the maker claims.

Allis-Chalmers Mfg. Co., 1078 S. 70 St., Milwaukee.

Turn the page

LOOK at this FLOOR!

Ten 8000-lb. loads an hour— yet no sign of wear in 4 years!



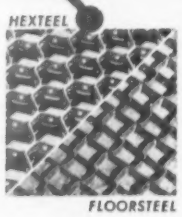
End dangerous, costly surface breaks!

REINFORCE WITH KLEMP

HEXTEEL®

Heavy-duty surface armor

FLOORSTEEL® flexible floor armor



● Check into what your company has spent for floor surface maintenance in the past 5 years. You may have a rude shock! Then, realize that no properly installed HEXTEEL or FLOORSTEEL reinforced floor has EVER worn out—and you will experience a happy awakening from the nightmare of excessive maintenance, damaged equipment and materials, plus personal injury risks. Send for FREE facts *now!*

KLEMP METAL GRATING CORPORATION
1371 NORTH BRANCH STREET, CHICAGO 22, ILL.
Plants and Warehouses at Chicago, Illinois and Houston, Texas

We Tread the World with Safety

Manufacturers of the Most Diversified Line of Gratings in the World Including HEXTEEL and FLOORSTEEL Surface Armors: Open Welded and Diamond Riveted Gratings: Stair Treads.

MAIL COUPON OR TELEPHONE NOW!

Let the specialized Klemp engineer know your problem, give you complete information on HEXTEEL and FLOORSTEEL. Write today. If you have an immediate problem phone Klemp (collect) NOW. No obligation! Chicago, Ill. WHitehall 3-0845.

Klemp Metal Grating Corporation
1371 North Branch Street
Chicago 22, Illinois

Please send me information about *Hexteel* and *Floorsteel* as used by more than 250 famous industrial and commercial firms.

Name_____

Address_____

City_____ State_____

FM-4

STANDARDAIRE BLOWERS take the SHOCK out of compression

The Standardaire Axial Flow Positive Displacement Blower

Standardaire Axial Flow Positive Displacement Blowers operate on a principle of compression unlike any other blowers. Their symmetrically generated rotors act as an air screw, drawing in and discharging air smoothly from the pockets which form between them.

Compression is gradual, completely internal and free from shock. Internal pressure is raised to equal discharge pressure before the pocket registers with the discharge port, eliminating the slap back and loading of internal parts common to many types of blowers.

Standardaire Blowers move more air, with less wear, less maintenance and power cost than any blowers of equal weight, size or comparable design.

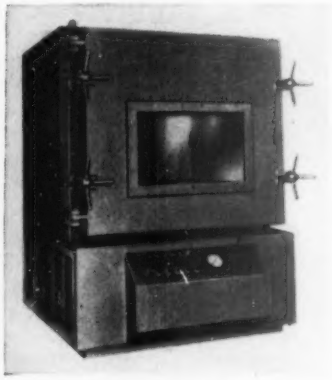
For further information, write:

READ STANDARD CORPORATION

BLOWER-STOKER DIVISION
370 Lexington Avenue, New York 17, New York

NEW AUXILIARY EQUIPMENT

Begins on page 164



Multi-Purpose Unit for Simulation Tests

Products, materials, and equipment can be tested under many conditions of heat, cold, moisture, and vacuum with the Altitude Simulation Chamber. The unit is designed to meet all government standards for this type of test.

Laboratory-tested before shipment. Final attachment of water, drain, and electrical facilities is all that is required to put unit into operation.

Murphy & Miller, Inc., 1322 S. Michigan Ave., Chicago.

■

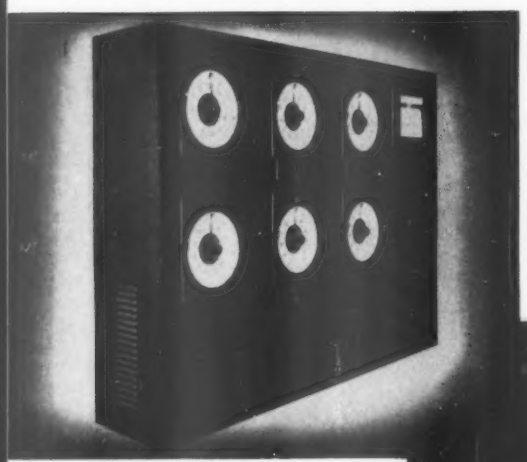
CORROSION - RESISTANT FIBROUS GLASS TANKS are now being fabricated from flat stock by the Laminex Corp., 994 Jefferson St., Fall River, Mass. This new method of manufacturing the tanks (they were formerly molded) has helped keep down production costs. Tanks can now be ordered in all sizes.

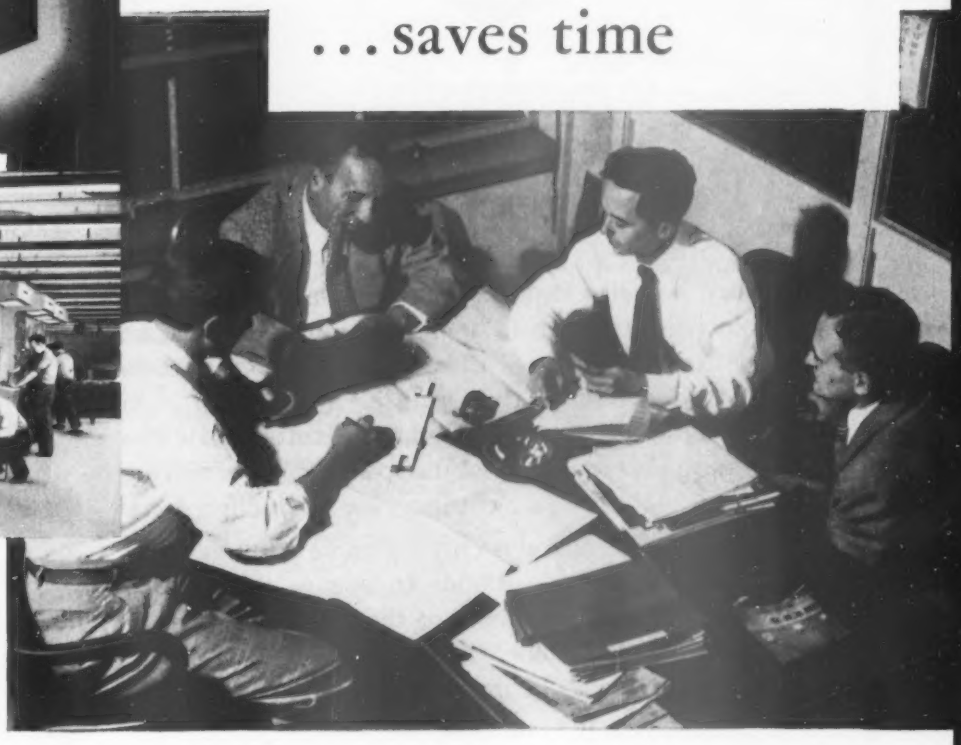
■

MINIATURE BLOWERS designed for cooling industrial and electronic equipment are available in four sizes. Made by Electroflow Pumps, Inc., 4811 Anaheim-Telegraph Rd., Los Angeles, the units are constructed of molded plastic material and reinforced with fibrous glass.

Turn the page

Job-engineered instrumentation by Honeywell assures performance ... saves time





APPLICATION ENGINEERING *starts with cooperative discussion between customer and Honeywell engineering representatives . . . follows through to design and assembly of complete control systems*

THERE'S more to instrumentation than instruments. Any control system, to do its job right, has to be designed for the methods, equipment, materials and of the process with which it works.

Here is where Honeywell Application Engineering steps in. First, a Honeywell engineering representative discusses process details with your engineers, production men and instrument technicians. Then he refers the problem to staff application engineers . . . each of whom is trained in the methods and control techniques for a specific industry.

These men work out details of what instrument to use for each measurement or control function . . . what type of primary element . . . what control system . . . what size and style of valve. Then they combine all these components into a complete system that is arranged for greatest production efficiency, convenience, and ease of service.

The new result to you is two-fold. First, this service saves you many valuable man-hours by supplementing the work of your own engineering staff. Second, you're assured of a control system that will give you the best in performance, not only of the Honeywell instruments, but also of the process which they serve.

Application engineering is one of the most important plus values you get from Honeywell instrumentation. Ask your local representative to discuss how it can go to work in your plant modernization or expansion . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4461 Wayne Avenue Philadelphia 44, Pa.

MINNEAPOLIS **Honeywell**

BROWN INSTRUMENTS

First in Controls

Can man-made fibers cut your costs?

DU PONT'S VERSATILE FIBERS ARE RAW MATERIALS FOR NEW EFFICIENCY . . . ECONOMY

Industry is finding that Du Pont's man-made fibers offer countless opportunities to improve products or processes . . . or to create new ones. Chemists have built into these fibers properties that nature can't always supply . . . in combinations that meet the complex needs of industry. The uses shown here may suggest unexpected ways of solving your own problems . . . cutting your production costs.

But these examples give only a glimpse of the amazing range of possibilities available to you in these fibers. Du Pont offers you a choice of these versatile fibers—nylon, acetate, "Cordura" high tenacity rayon, "Orlon" and "Dacron"—each of them chemically and physically uniform as only a fiber made by man can be.

See your own supplier for industrial products made with these fibers. They may better serve your needs, too. For information about any or all Du Pont fibers, write E. I. du Pont de Nemours & Co. (Inc.), Textile Fibers Department, Wilmington 98, Delaware.

NYLON: ***Its fast-drying properties doubled production.*** The speed of a fabric-printing machine was retarded by the time taken to clean and dry the griege—a cloth used to blot up excess dye. Easy-cleaning, fast-drying nylon grieges have now virtually doubled machine speed and production. Costs were cut, too, because nylon's exceptional strength when wet makes these greiges outlast others 5 to 1.

"ORLON": ***Its acid and heat resistance turned a processing loss into a profit.*** A carbon-black manufacturer found a desirable new process unprofitable because fine particles were lost through the stack. Ordinary filter bags were useless because acid fumes quickly destroyed them. But bags of acid-resistant "Orlon" stood the test . . . made the new operation profitable.

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

NYLON
ACETATE
CORDURA*
high tenacity rayon
ORLON*
acrylic fiber
DACRON*
polyester fiber
*Du Pont trademark

fibers to fit industry's

"CORDURA": *Its stretch-free strength multiplied life of belting.* Severe heat and dust in drying ovens were breaking down transmission belts, in as little as 44 days, causing expensive shutdowns. Engineers suggested belts sinewed with "Cordura" for greater strength, less stretch and slippage. After 2¼ years of continuous service, these belts are still going strong.

"DACRON": *Its high tenacity and stretch-resistance improve fire hose.* By using "Dacron" for the load-carrying "filling" cord, fire hose can be made more flexible, 12 to 15% lighter, and 50% stronger than conventional hose of the same diameter. One fire department reports that its trucks can now carry 1500 ft. of hose, as against 900 ft. formerly.

needs

NEW AUXILIARY EQUIPMENT

Begins on page 164

Low-Boiler-Hp Steam Generators

"Hotshot Tandem" is the trade name of these low-boiler-hp., high-efficiency electric steam generators. Models are in production to develop from 1.8 to 3.6 boiler-hp. each.

The advantage of these units is that they can either operate individually or in tandem. Every component is a generator in itself and can be cut in and out whenever horsepower requirements are increased or decreased.

Automatic Steam Products Corp., 140 W. 31st St., New York.

■

Fluid Coupling

Standard motors can now be equipped with fluid drive. The coupling is compact and leak proof. Furthermore, it is no larger in diameter than the average motor and adds less than 1 inch to the length.

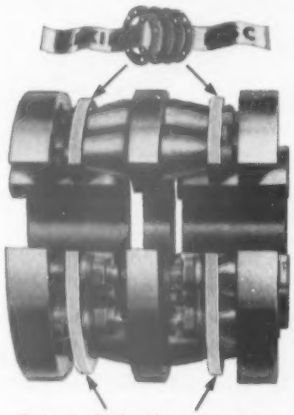
Flexible coupling or V-belt pulley are supplied. Sizes available range from ¼ hp. to 4 hp.

L & S Industries, Box 577, Norwalk, Calif.

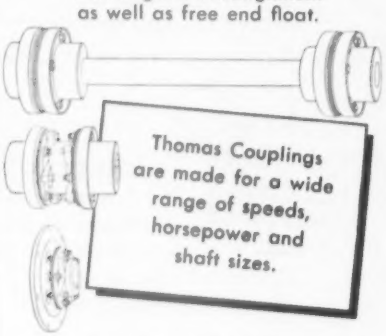
Turn the page

Specify **THOMAS** ALL METAL **FLEXIBLE COUPLINGS** for Power Transmission to avoid Costly Shut-Downs

DISTINCTIVE ADVANTAGES	
FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.



Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes.

THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT

NO MAINTENANCE PROBLEMS

ALL PARTS ARE SOLIDLY BOLTED TOGETHER

Write for our new Engineering Catalog No. 51

THOMAS FLEXIBLE COUPLING CO.

WARREN, PENNSYLVANIA, U.S.A.

with KEX wiping towels...

"I decided long ago to stop buying scrap rags and waste by the pound and switch to Kex wiping towels because a lot of the stuff we were getting wasn't usable. It had no uniformity and the men had to pick and choose the right piece for every job. That isn't true with Kex—every square inch is usable.

"After the first few months of using Kex Service my month-end cost for wipers was down substantially! The men have a uniformly-sized, absorbent towel for every job. And we don't run the risk of scratching or damaging delicate precision machinery."

YOU DON'T BUY A THING—just pay a low monthly rental. Kex towels are distributed nationally—for complete information, see your Classified Telephone Directory for nearest Kex distributor, or write Kex National Service, 295 Fifth Avenue, New York 16, N.Y.

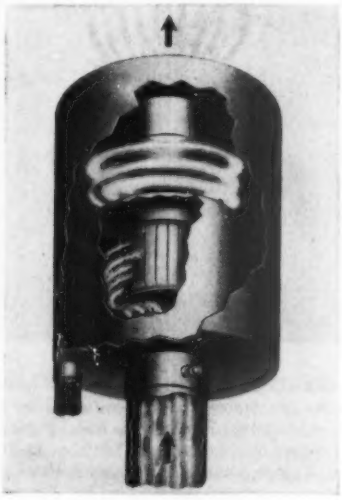
"KEX" NATIONAL SERVICE

REG. U.S. PAT. OFF.

It isn't Kex unless it's imprinted with the Kex name

NEW AUXILIARY EQUIPMENT

Begins on page 164



Exhaust Head Cleans Steam and Vapors

This new exhaust head for industrial stacks will clean steam and vapor discharge, thus preventing nuisance particles from attacking your machinery and buildings, says the maker. The head has no moving parts or filters.

As the vapor enters the purifier, it passes through a stationary element which causes it to rotate rapidly. This action thrusts the dirt particles outward, where they are collected in a drain. The units are fabricated to specification.

V. D. Anderson Co., 1935 W. 96 St., Cleveland 22.

■

Automatic Multiple Embossing Machine

You can now automatically emboss metal addressing plates or property identification tags with serial numbers, part numbers, special coding, or repetitive gang-embossed information. Machine operates at 90 plates per minute.

Designed with various lever and wheel set controls and built in units, the machine is adaptable to many applications, the maker

Which of these PACKAGING IDEAS will cut *your* costs?

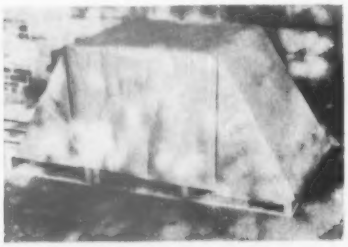
- *Reinforced*
- *Waterproofed*
- *Six widths*
- *Easily dispensed by "cut-off" type machines*

Our Industrial Papers Have Solved These Problems!

Can we help *you*?

Angier

To meet JAN-B-121, you can't beat the *original* Grade A: INDUWRAP. It's the acetate greaseproof barrier for parts slushed in synthetic or petroleum-based compounds.
☐ *Check here for facts.*



Stronger Wrap for Big Packs

Angier's new Glass Wrap is reinforced with strong glass fibres to give *better* protection at less cost. Waterproofed; flexible; up to 96" wide.
☐ *Check here for facts.*

Center-seam Sealing with Reinforced SNAKE TAPE

It's the *fast* way to seal cartons as the motion photo shows. And you get a *stronger* closure with only two strips because Snake Tape is reinforced to give strap-like strength! It can save time for you as it is for New England Storage Warehouse Company.
Center-seam sealing is accepted for parcel post, railway express, air express, and truck shipments; it also is accepted for carload and LCL rail shipments where rule 5, section 1 (c) of Uniform Classification applies.
☐ *Check here for FREE sample & facts.*

☑ Check the ideas that interest *you* and send with letterhead to:
ANGIER CORPORATION
Framingham 1, Massachusetts

Since 1895 Manufacturers of Industrial Packaging Papers

● TO Cincinnati's Union Terminal come travelers . . visitors . conventioneers — seeking pleasure, knowledge, products for which Cincinnati is famous: valves, machine tools television sets, soap, A-F Engineered Conveying Systems.

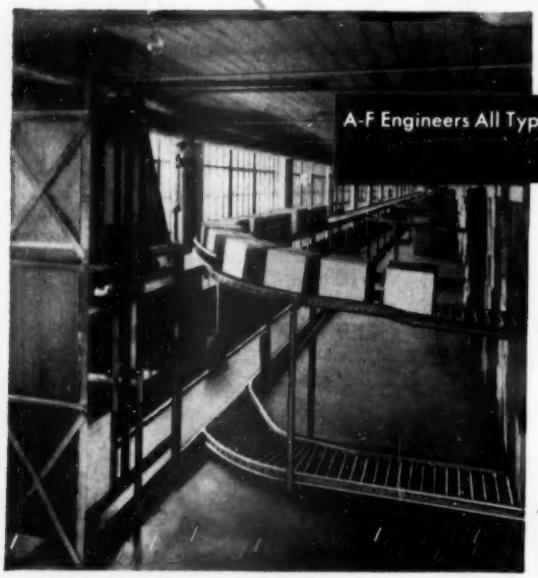
cincinnati

home of

ALVEY-FERGUSON

the original-Since 1901

engineered conveying systems



A-F Engineers All Types of Conveying Systems For All Types of Plants

A-F You can SEE the Superiority of ALVEY-FERGUSON Conveyor Engineering

A-F For a discussion of latest efficient methods of handling products and materials write:

THE ALVEY-FERGUSON COMPANY

134 Disney St. REPRESENTATIVES IN PRINCIPAL CITIES Cincinnati 9, Ohio

NEW AUXILIARY EQUIPMENT

Begins on page 164

claims. It notches plates for classification, can loop thread and wire through tag holes. These operations are performed simultaneously with the embossing.

Dashew Business Machine Co., 847 N. La Cienega Blvd., Los Angeles 46.

■

Insulated Glass Skylight Block

Known as Skytrol, this new glass skylight block has been especially developed to overcome the problems of glare, condensation and heat gain and loss, the manufacturer says.

A fibrous glass screen sealed inside the block adds to insulating properties and aids daylighting control by diffusing the light, the maker claims.

The blocks are produced in 12-in. squares, 4 inches thick. The smooth top surface is designed for easy cleaning.

Pittsburgh Corning Corp., 307 Fourth Ave., Pittsburgh 22.

■

CENTRIFUGAL PUMPS adaptable to continuous and intermittent pumping operations of numerous industries are offered by the Pioneer Pump Div., Detroit Harvester Co., 19657 John R. St., Detroit 3. Each pump model is available in sizes from 1/20 to 5 hp.

Turn the page

Cities Service Cutting Oils Proved The Very Best By Micrometer Test!

CUTTER MEASURED WITH MICROMETER. As a final test, Automatic Pencil Sharpener measures each cutter with a micrometer. All tests proved that Cities Service cutting oil was absolutely tops for this really tough job.

STRICT SPECIFICATIONS REQUIRE FINEST CUTTING OIL. APSCO Sharpeners offer many more features than other brands. To produce their top quality product, Spengler-Loomis relies on top-quality lubrication products . . . Cities Service Products, famous throughout industry.

ONLY .005 INCHES BURR OR BUILD-UP ALLOWED IN FIFTY-HOUR OPERATION CUTTING GROOVE IN B1112 STEEL!

Says Mr. C. J. Kostrzewa, Plant Superintendent: "Cutting oil requirements in our Automatic Pencil Sharpener Division are tough. To find the right coolant, we called for, and tested, samples from various companies. Over a period of testing time, we used graphs, charts and tables, keeping a running record on all coolants. As a final test, we measured the cutter with a micrometer before and after milling. The cutting oil that came out tops was Cities Service.

"I'd also like to point out that the Cities Service Engineering staff co-operated fully by offering helpful advice and excellent service."

Why not discuss your lubrication problems with a Cities Service lubrication engineer? Write Cities Service Oil Company, Dept. D28, Sixty Wall Tower, New York 5, New York—or contact your nearest Cities Service office.

CITIES SERVICE
QUALITY PETROLEUM PRODUCTS

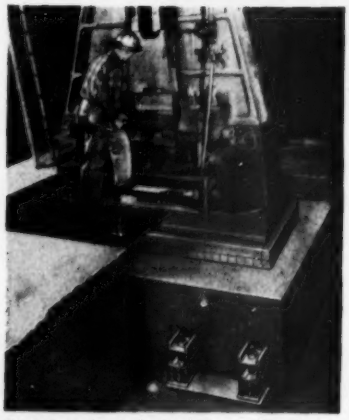
STOP VIBRATION

WITH

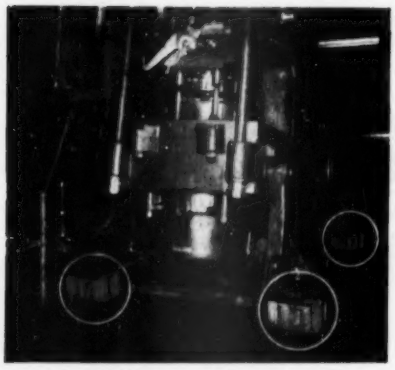
KORFUND VIBRATION CONTROL

Reducing transmitted vibration and dynamic loads with Korfund Vibration Control gives:

- **More efficient plant layout**
- **Elimination of special foundations for most machines**
- **Reduced rejects—improved work quality**
- **Increased production**
- **Reduced maintenance**
- **Reduced noise and employee fatigue**



Typical spring-isolated hammer foundation. Shock isolation is so complete that a coin will remain standing on edge beside the foundation as maximum blows are struck. Tests prove there is actually a slight increase in hammer blow efficiency.



Korfund Vibro-Isolators solved a serious vibration problem, and permitted installation of this 100 ton press on a weak upper floor in a loft building. Isolators often permit higher press speeds for greater production.

Today's precision machine tools pay off in high production to close tolerances when protected from external disturbances. Special foundations can often be eliminated with economical vibration control.

Vibration and shock transmission can be stopped at the source by mounting impact machinery such as hammers and punch presses, and mechanical equipment such as pumps and compressors on Korfund Vibro-Isolators. Accuracy of precision machines such as grinders, borematics and jig borers can be protected against external vibration with Korfund machine tool mountings. Furnace arch and globar life can be more than doubled with protective Korfund furnace mountings.

Installation is simplified by means of Korfund Vibration Control for most machines because they can be installed on ordinary floors without special foundations. Furthermore, better equipment layout gives straight-line work flow for higher production.

Standard Korfund Isolators are available for most applications. A Selector Chart in bulletin G-105 gives recommendations for both normal and critical conditions, for hammers, machine tools, pumps, compressors, fans and most other mechanical equipment. See Sweet's Catalog Files or write us for your free copy today.

We'll gladly submit recommendations without obligation. Just contact us, or the Korfund representative you will find in most principal cities. A half century of experience is at your disposal.

THE KORFUND COMPANY, INC.

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

4-KC-3 Thirty Second Place, Long Island City 1, N. Y.
In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

NEW AUXILIARY EQUIPMENT

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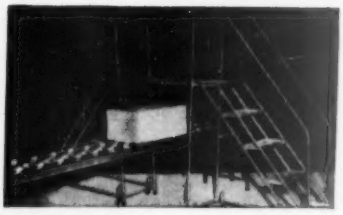


Conveyor Walk-Over

This combination of ladders and a walkway allows easy passage of employees over conveyor lines. It is so constructed that the walkway can be folded up and the ladders used for other tasks in the plant.

The equipment is constructed of steel and is available with automatically retractable casters. Standard size ladders can be procured for practically any required height.

Ballymore Co., Wayne, Pa.

■

Motors Designed for Severe Exposures

A new line of totally enclosed and explosion-proof construction motors has been marketed. These units, designed for application in the chemical industry, have had Special Class A chemical insulation treatment.

Steel parts of the motors have been dipped in a corrosion-resistant coating, then baked and painted. Available in ratings from 1 to 40 hp., in NEMA frames up to 405. All frames are constructed with stainless steel outer shells.

Robbins and Myers, Inc., Springfield 99, Ohio.

■

BALANCED MECHANICAL SEAL, heavy-duty type, for use in conventional pump stuffing boxes is being made by the Crane Packing Co., 1800 W. Cuyler Ave., Chicago 13. Designed to withstand high pressures, the manufacturer claims.

Turn the page

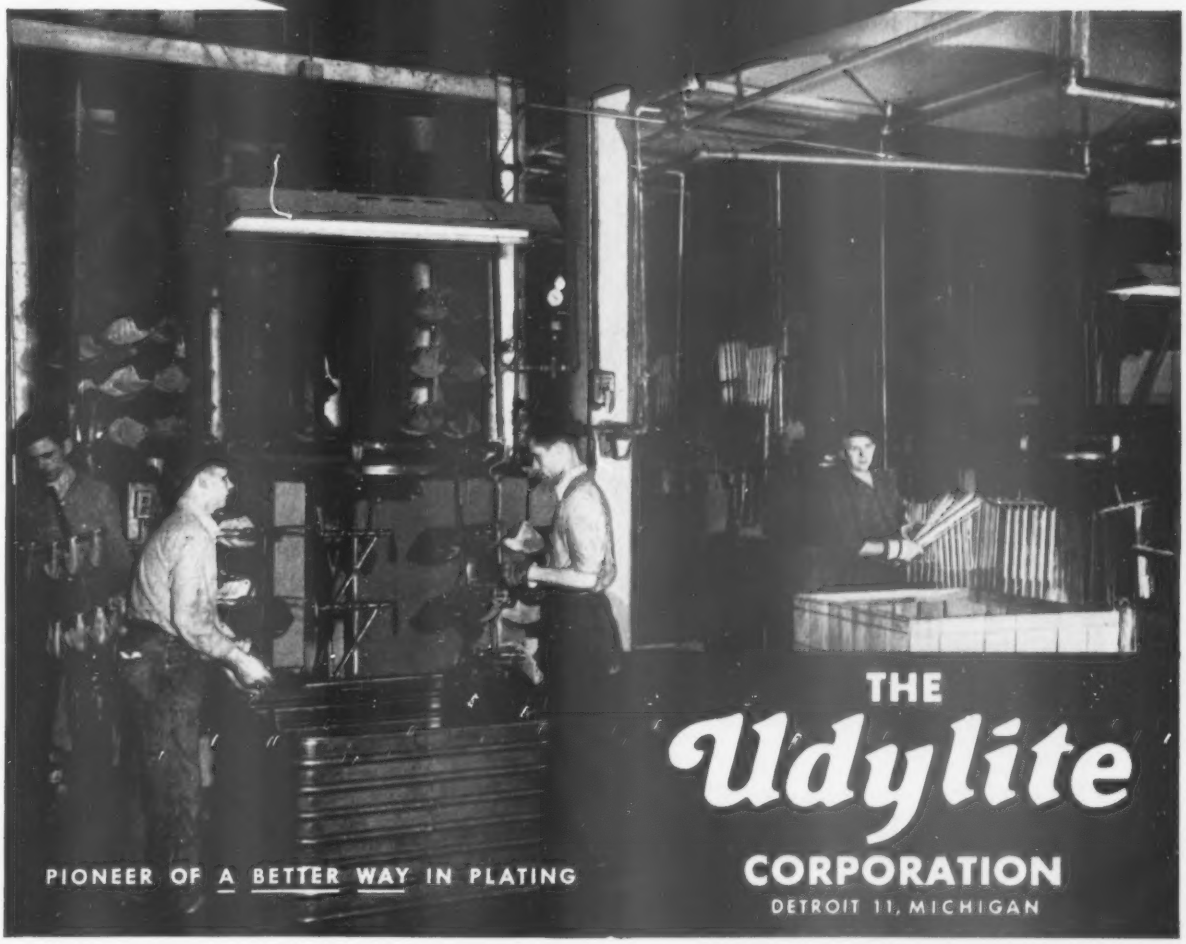
UDYLITE FULL AUTOMATIC CROSSES OFF REJECTS . . .

at the Dura Company of Toledo!

"Thousands and thousands of window regulators for automobiles go through the Dura Company Zinc Plating installation. Our Udylite Full Automatic practically eliminates rejects."

But that's only part of the Dura Company story. With their Udylite Full Automatic they get high production runs, too. This means a quality product at rock-bottom cost. It's easy to see that Udylite equipment is paying off for this modern, progressive company.

Why not bring YOUR plating problem to Udylite. Let us show you how Udylite equipment, research and supplies can give YOU top results. Call your Udylite technical man today or write direct. There's no obligation. THE UDYLITE CORPORATION, DETROIT 11, MICH.



PIONEER OF A BETTER WAY IN PLATING

THE Udylite CORPORATION
DETROIT 11, MICHIGAN

Spread the Bright Coat...

Nothing Protects like

Use it Inside...

LIQUID ALUMINUM PAINT

Put *Liquid Aluminum* to work in and around your plant and watch your maintenance costs go down. *Liquid Aluminum* is amazingly resistant to rust . . . resists corrosion from smoke and fumes, too. It reflects up to 85% of heat and light rays—thus reduces evaporation losses from tanks and makes plant interiors more comfortable the year 'round. And, *Liquid Aluminum* beautifies as it protects—brightens all it covers.

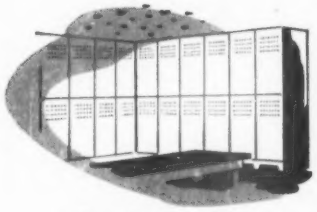
Look for the *Liquid Aluminum* Label on the aluminum paint you choose for those countless uses inside and outside your plant. Many leading paint manufacturers make *Liquid Aluminum*—it's your assurance of quality.

LIQUID ALUMINUM ASPHALT ROOF PAINT OR COATING

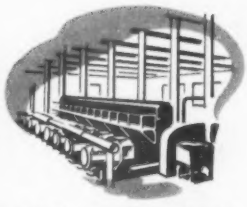
Here's economical, lasting, one-coat protection for your built-up or your rustable metal roofs! Liquid Aluminum Asphalt Roof Paint or Coating adds years to roof life; keeps buildings cooler in summer; cuts air conditioning costs; increases employee efficiency and morale. The Warranty at left, found on Asphalt-Aluminum Roof Paints or Coatings made by leading manufacturers, is your guarantee of the right amount of aluminum pigment in an approved vehicle.

"Liquid Aluminum"

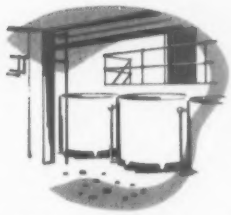
Outside . . . All around Industry!



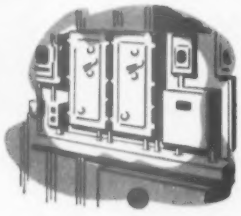
Keeps lockers and locker rooms brighter, cleaner, attractive.



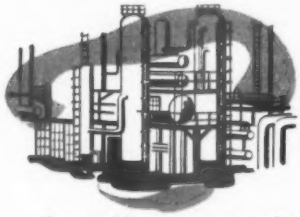
Brightens and protects walls, posts, ceilings, stairs, etc.



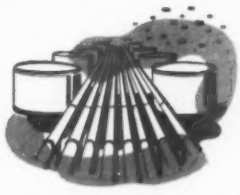
Helps toward cleanliness in food, dairy and other plants.



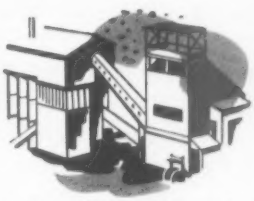
Aids in rapid identification of control boxes, valves, etc.



Cuts outside maintenance, makes all exposed metals last longer.



Protects pipes, tanks, etc., against rust and corrosion.



Lengthens life of rustable metal roofing, siding, gutters, etc.

Improves appearance and value . . . cuts evaporation losses.

Asphalt-Aluminum Roof Paints and Coatings are fast and easy to apply—spray them on or brush them on.

In actual roof applications, roof temperatures dropped 24° in 10 minutes after Asphalt-Aluminum Roof Paint or Coating was applied.

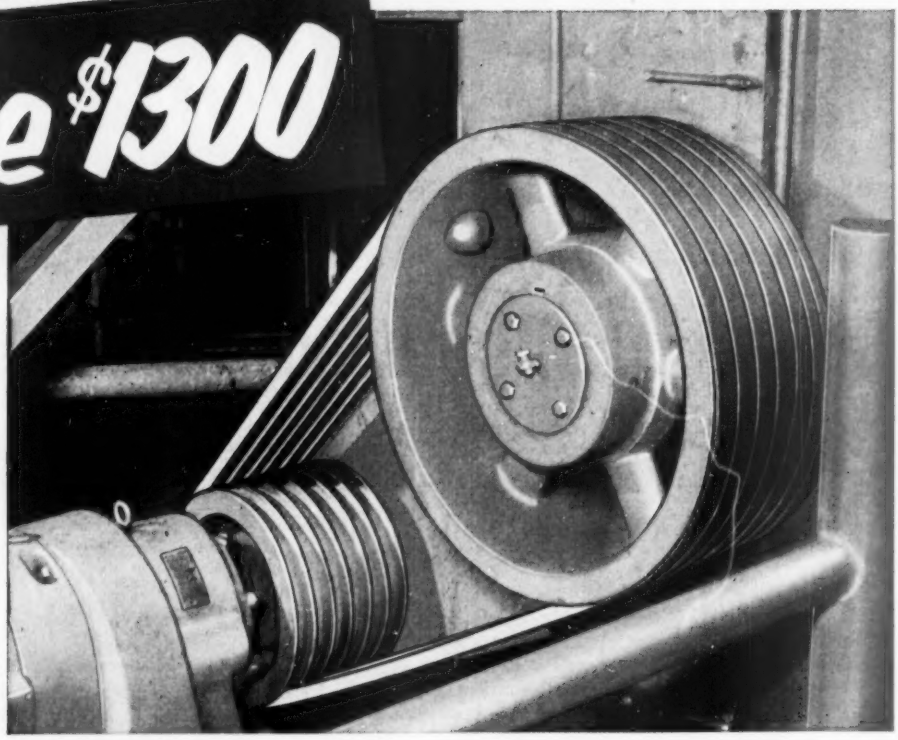
LOWER UNDER ROOF TEMPERATURES

Ask to see the Reynolds Thermometer Test . . . get graphic proof of the amazing way that Asphalt-Aluminum Roof Paint or Coating can reduce under-roof temperatures.

This advertisement appears in the interest of the Roof Paint and Coating Industry of the United States

REYNOLDS METALS COMPANY, 2518 South Third Street, Louisville, Kentucky

See how V-Belt *Preventive Maintenance* can Save $1300



What is the *real* cost of replacing a set of V-Belts on a machine? Often it is far more than just the cost of belts.

For example: A dye works operates this heavy-duty calender which processes 500 feet of cloth per minute. The drive has 6 belts. Here's the cost when the calender is shut down for a belt change:

Cost of new belts	$ 120.00
Cost of labor	2.00
Cost of lost production during down time	1300.00
Total cost of belt change	$1422.00

Dayton V-Belt Survey Experts often can extend the time period between belt changes by 50 per cent—through installing Dayton V-Belts. In this textile plant, for instance, it would be possible to extend the time between changes from 5 to 7½ years. This, in itself, is a worthwhile saving. *But the real pay off comes from the elimination of costly down time through Dayton's Preventive Maintenance Program.*

You too can make BIG savings with Dayton V-Belts and Preventive Maintenance. Call your Dayton Jobber for further details. He's listed under "Belting" in your local telephone directory.

DAYTON RUBBER COMPANY • DAYTON 1, OHIO

Dayton Rubber

Since 1905

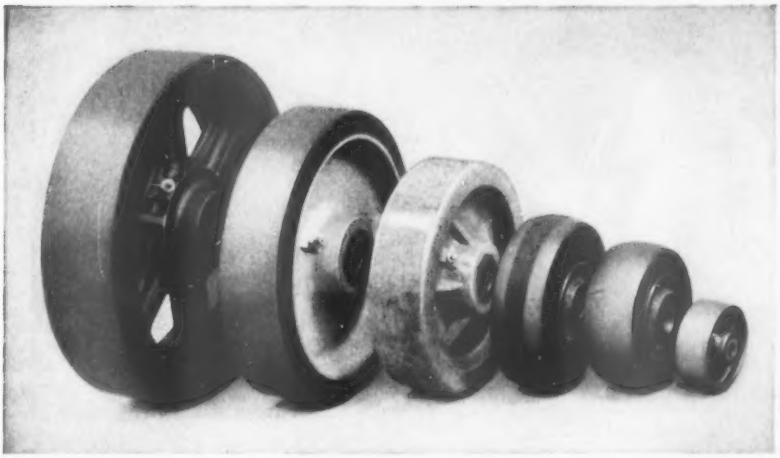
WORLD'S LARGEST MANUFACTURER OF V-BELTS

© D.R. 1953

MATERIALS-HANDLING NEWS

★ Panel Discussions by Bassick, World's Largest Manufacturer of Casters and Floor Protection Equipment ★

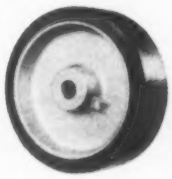
Bassick Industrial Wheels in Varied Types, Sizes Keep Needed Materials on the Move



At the bottom of things in any well-planned, fast-moving industrial operation, you'll find a need for Bassick wheels. Available in a wide range of sizes and types to meet any requirement, Bassick Industrial Wheels make it easier to keep materials parts moving on schedule. They save manual effort because they roll easier and faster . . . save money because they're built to quality standards to deliver years of efficient performance.

Oncore

soft rubber tread vulcanized on high-strength semi-steel core. Roller bearings. Widely used wherever large-diameter wheels are required.
Sizes: 5 to 16 in.



Alcore

soft rubber tread vulcanized on special aluminum alloy core for light weight, easier rolling. Ball or roller bearings.
Sizes: 5 to 12 inches.

Canaphin

non-sparking solid wheel molded of macerated canvas and phenolic resin to resist severe shock, acids and extreme heat.
Sizes: 3 to 8 in.

Baco

soft rubber tread molded and bonded by special vulcanization process to solid core. Eliminates tire changes, protects floors. Roller or self-lubricating bearings. Ideal for light and medium service.
Sizes: 1¾ to 8 in.

Atlasite

solid tread molded of special rubber and fiber compound. Carrying capacity equals that of metal wheels, with less floor wear and noise. Resistant to water, oil and most acids. Roller or self-lubricating bearings. Sizes: 1¾ to 8 in.

Biron

precision-made from powdered iron. Oil-impregnated self-lubricating bearings. The highest quality small metal wheels.
Sizes: 1¼ to 3 in.

Great-Grandpappy of The Modern Wheel

Big wheels, little wheels, wheels within wheels all stem from this primitive prototype which was Stone Age man's first attempt at materials-handling. Nobody knows who first discovered that it's easier to pull or push a load than carry it, but he set mankind on the road to progress when he hit upon the idea of using tree-trunks as rollers. Next stage in the history of the wheel was the solid wooden disc, followed around 1800 BC by the spoked wheel.

Still the basic working shape of our civilization, the wheel today is used in practically every kind of materials-handling equipment. Bassick industrial wheels are manufactured in a large variety of materials, sizes and capacities for use either as wheels or in casters. In both assignments, Bassick wheels roll fast and easily, and stand up under the toughest operating conditions.

To help keep your production rolling, call your Bassick industrial distributor for recommendations on the best Bassick wheel for the job. Or write directly to Bassick at the address below.

THE BASSICK COMPANY
Bridgeport 2, Conn.
In Canada:
Belleville, Ont.

Bassick
A DIVISION OF
STEWART SW WARNER
MAKING MORE KINDS OF CASTERS . . . MAKING CASTERS DO MORE

is

coil-itis* increasing your temperature problem?

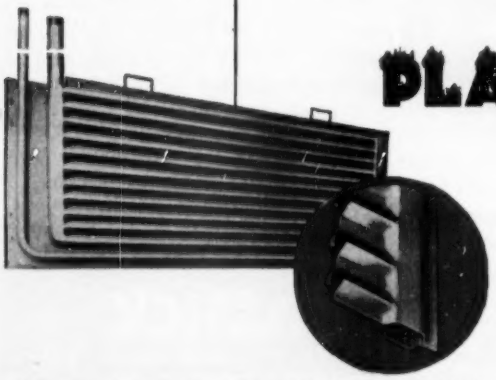
Here is a new treatment for solving your heat transfer problems that is as revolutionary as a new wonder drug. It stops coil-itis* cold . . . It eliminates the many troubles that have plagued industrial heating and cooling practices due to the use of old-fashioned, outmoded pipe coils. This revolutionary new unit, called a Platecoil, heats or cools 50% faster and takes 50% less space in the tank. It simplifies maintenance and saves hours of downtime.

Write for bulletin P60 today!

PLATECOILS SAVE 50% IN HEAT TRANSFER COSTS

PLATECOILS COOL QUENCH OIL TANK FOR ⅓ THE COST

At the K-D Manufacturing Company, Platecoils are proving more efficient, yet cost only 1/3 as much to install. Ask about other case histories.



PLATECOIL

REPLACES PIPE COILS

*

Coil-itis — Diagnosed as tank heating and cooling problems. **Platecoils** — the prescription for solving pipe coil problems.

PLATECOIL DIVISION, KOLD-HOLD MANUFACTURING CO., LANSING 4, MICHIGAN

NEW AUXILIARY EQUIPMENT

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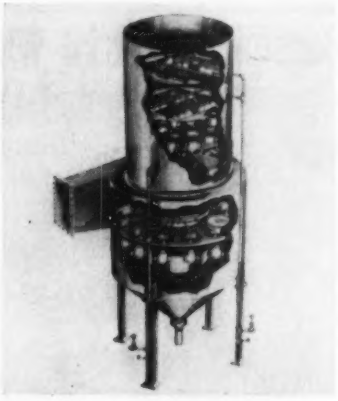


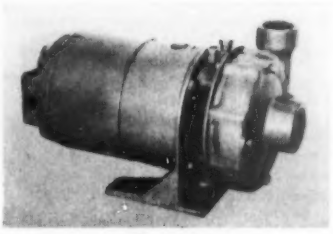
Multi-Action Scrubber Cleans Stack Dust

A new system for controlling stack dust which incorporates six different principles of dust precipitation has been marketed. The unit can be used to control dust from rotary dryers, kilns, roasters, mixers, and similar equipment.

The device, known as the Liquid Precipitator Multiple-Action Scrubber (Type V), requires less water than many other scrubbers. The assembly is compact and can be easily moved. The unit can be attached to existing duct work without complicated piping, the maker says.

Johnson-March Corp., Philadelphia, Pa.

■



Close-Coupled Centrifugal Pump

Designed for the requirements of air conditioning but adaptable to many other industrial uses, this close-coupled centrifugal pump combines pump and motor in a

You expect the best value from G-E fluorescent lamps

Rugged aluminum base helps G-E lamps last longer

You've probably noticed that G-E fluorescent lamps now have bases made of a white shiny metal, instead of the usual yellow brass or black plastic. It's aluminum.

Aluminum is light and resilient. Won't crack from hard bumps and jolts. Can take the high heats needed to get the best seal between base and glass tube. Doesn't shrink at low temperatures so it won't crack the glass tube in cold weather. It helps prevent failure in G-E lamps.

Five years of General Electric lamp research helped make this use of aluminum possible. It shows again why you can *expect* the best value from G-E fluorescent lamps.

You can put your confidence in—

GENERAL ELECTRIC

To assure the constant tension which is an important factor in cloth handling, plant engineers of the Kendall Mills, Charlotte, N. C. equipped a cloth handling machine with six MICRO switches at strategic points.

These switches operate to maintain the speed of the machine at the same number of pounds stretch per inch width throughout the handling process.

Plant engineers in all lines of industry are finding that the application of one or more of these precise, easily mounted switches is the most practical and economical way to make present equipment safer, more automatic and more productive.

Authorized MICRO distributors are located in over 100 key cities with complete stocks of switches best suited to individual plant requirements. Look for your nearest distributor under "Switches, Electric" in your classified phone book. For more detailed information, help is always available from your nearest MICRO branch office.

For live, practical ideas on switch applications, send for MICRO TIPS. We'll be glad to add your name to our mailing list.

MICRO A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY
MAKERS OF PRECISION SWITCHES
FREEPORT, ILLINOIS

NEW AUXILIARY EQUIPMENT

Begins on page 164

single unit. The casing is vertically split for easy inspection and maintenance without disturbing piping connections.

Called the Fig. 3642 Pump by the manufacturer, it delivers 110 gpm. and operates at heads up to 110 ft. The electric drive motors range from ¼ to 2 hp.

Goulds Pumps, Inc., Seneca Falls, N. Y.

■

High-Capacity Oil Reclaimer

Called Hilco Hyflow Oil Reclaimer by the maker. Primary function is maintaining cleanliness in lubricating and industrial oils by the continuous removal of contaminants.

Can be used for purifying and maintaining transformer oils, vacuum pump lubricating and sealing oils, and diesel and gasoline engine lubricating oils, the manufacturer says.

Units available in capacities up to 500 gph. Built to customer's requirements.

Hilliard Corp., 102 W. Fourth St., Elmira, N. Y.

■

TAPER-LOCK SPROCKETS flange or protruding parts are now in production at the Dodge Manufacturing Corp., Mishawaka, Ind. Available for off-the-shelf distribution, these B - type sprockets, for use with any make of Standard American roller chain, are offered with a pitch from 40 to 100. The units are made to ASA standards.

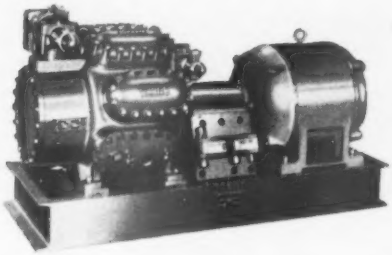
■

WELDING TORCH MIXER using Gas-Tite seating rings has been developed by the National Cylinder Gas Co., 840 N. Michigan Ave., Chicago 11. The gasket-like seating allows the mixer to be attached to the torch without the use of a wrench.

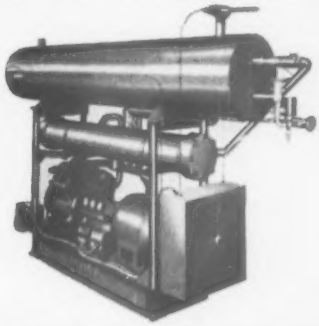
Turn the page

Here's how Trane refrigeration can help solve your production problems

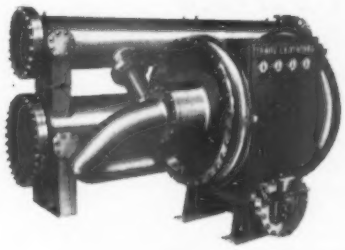
DEHUMIDIFYING and controlling moisture accurately can, as you well know, speed production, improve quality, reduce waste and spoilage. If this is your problem, talk to TRANE. TRANE Reciprocating Compressors, combined with TRANE Climate Changers, control humidity in textile mills, printing plants, storage areas, precision parts finishing and assembly rooms . . . and hundreds of other places. These compressors incorporate the most advanced engineering features. Capacities from 3 to 50 tons.



WATER CHILLING for industrial processes such as electroplating, metal quenching, die cooling, rubber mixing and multi-color printing is now available from a *single* packaged unit . . . the TRANE Cold-Generator. This unit is completely assembled, charged and tested before shipment. Only simple wiring and plumbing connections required. Ten sizes for loads from 10 to 100 tons.



PROCESS AIR CONDITIONING applications in many large plants require water chilling capacities greater than 50 tons. If this is true in your plant, read this: The TRANE CenTraVac, a hermetic centrifugal unit, provides 45 to 200 tons of refrigeration. Self-contained, easily installed, completely automatic . . . the CenTraVac runs without special attention. No shaft seals or gear boxes. Only two main bearings in entire machine.



COMFORT AIR CONDITIONING is needed at many places in modern plants . . . offices, drafting rooms, tabulating machine rooms and other heat-gain areas. It increases employee efficiency, pays dividends in cleanliness too. It's smart to air condition—with TRANE. TRANE Self-Contained units arrive ready to run. Only simple electrical and plumbing connections are required. Six sizes from 3 to 20 tons capacity.

What's your special problem? Whether yours is a simple cooling problem or a complex one . . . whether it's large or small . . . the complete line of TRANE matched air conditioning products contains the right size and type equipment to fit the job. For detailed information, call your nearest TRANE sales engineer, or write to TRANE, La Crosse, Wis.

To solve any comfort or process air conditioning problem . . . talk to **TRANE**

The Trane Company, La Crosse, Wis. • East. Mfg. Div., Scranton, Penn.
Trane Co. of Canada, Ltd., Toronto • 80 U.S. and 14 Canadian Offices

P&H OVERHEAD CRANES

Only P&H BUILDS

COMPLETE ELECTRICAL EQUIPMENT

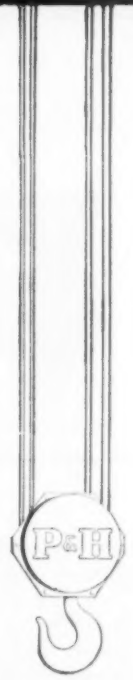
— designed specifically for Crane Service

You'll find a big difference in the crane electrical equipment built by P&H and that assembled from various sources. P&H designs it specifically for the severity of crane service. General purpose motors are not used. P&H has learned how to build crane motors through more than 50 years!

You'll find a big difference in performance—the entire crane is designed and built as a coordinated unit. P&H understands how to give you the utmost in faithful performance.

And you'll find a big difference in service when you need it. For only in this way can you put *all* the responsibility in the hands of *one dependable source*. There's no buck-passing among suppliers—no confusion or delays. P&H service is complete—reliable—alert. It will save you time and money. It's good reason for insisting upon P&H equipment throughout.

P&H ***MAGNETORQUE*® AC Crane Control** . . . an exclusive P&H development which provides speed-load characteristics not excelled by any other type of control. You should have all the facts about it. Write us.



P&H OVERHEAD CRANE DIVISION

HARNISCHFEGER CORPORATION

Milwaukee 46, Wisconsin

ELECTRICAL EQUIPMENT

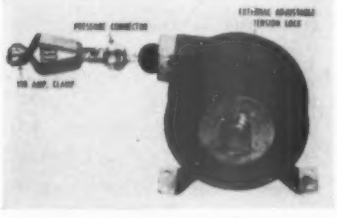
Low-Horsepower Electronic Drive

A packaged, adjustable-speed, electronic drive designed for use on testing machines, presses, conveyors, pumps, and similar devices is now available. The unit is made for ¾- to 3-hp. drives.

Speeds within a wide range are selected by single-knob control. This simplified Thy-mo-trol system consists of an anode transformer, electronic control panel, control station, and a d-c shunt-wound motor. It operates on 220/440 volts single-phase, 50/60 cycles.

General Electric Co., Schenectady 5, N. Y.

■



Static Discharge Reel With Tension Lock

You can now get static discharge reels equipped with external adjustable tension locks. This permits increasing or decreasing tension on the wind-up spring.

A pressure connector automatically breaks contact as soon as force is applied to the cable. Available in 40- and 80-ft. lengths, the reel is grounded through four electrical paths.

Ericson Manufacturing Co., 5209 Euclid Ave., Cleveland 3.

■

Bolt Heater

You can get greater bolt stressing when using hollow holding bolts with the new Corox bolt heater. The unit is offered in ratings from 1000 to 6200 watts, all at 120 volts. Various sizes of heater elements are available for bolts from 1 to 3 feet long with hole diameters from ½ to 1 in.

Westinghouse Electric Corp., Box 2099, Pittsburgh 30.

■

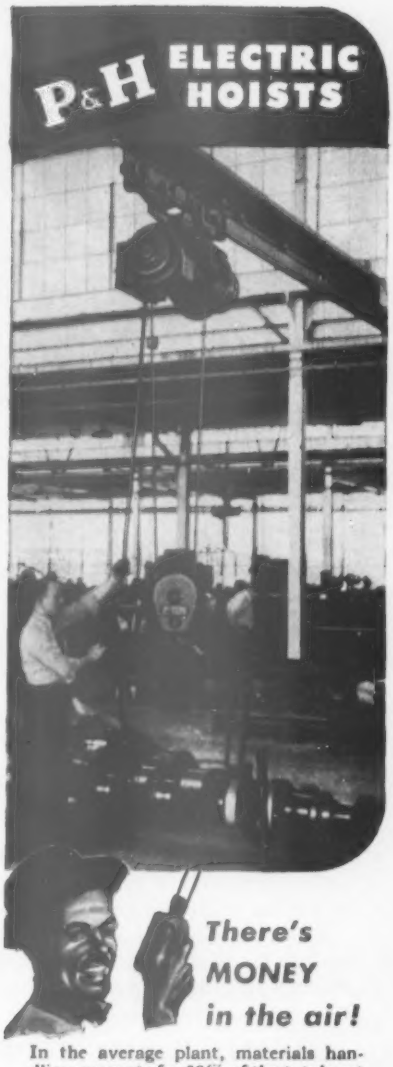
Explosion-Resisting Switch Enclosure

A new pressure switch in an explosion-resisting case for use on water pumps and air compressors is now available. Two types of this switch are offered; one with a 20- to 80-psi. pressure range and the second with a 40- to 200-psi. pressure range.

The operating mechanism is of the snap-action type and all internal parts are especially treated to resist corrosion. The enclosure is a 2-piece casting.

Square D Co., 4041 N. Richards St., Milwaukee 12.

Turn the page



In the average plant, materials handling accounts for 20% of the total cost of the product. How about your operation? Are skilled workers wasting your time and money being load-lifters? There's a better way —

Handle it "thru-the-air" FASTER—FOR LESS!

P&H can help you cut costs, with swift, safe movement of loads above floor congestion. There's a P&H Electric Hoist to suit your needs exactly; the Zip-Lift for loads up to 1 ton—the Hevi-Lift for loads up to 15 tons—available with hook, jib or trolley mounting. A P&H representative can show you where and how to save money.

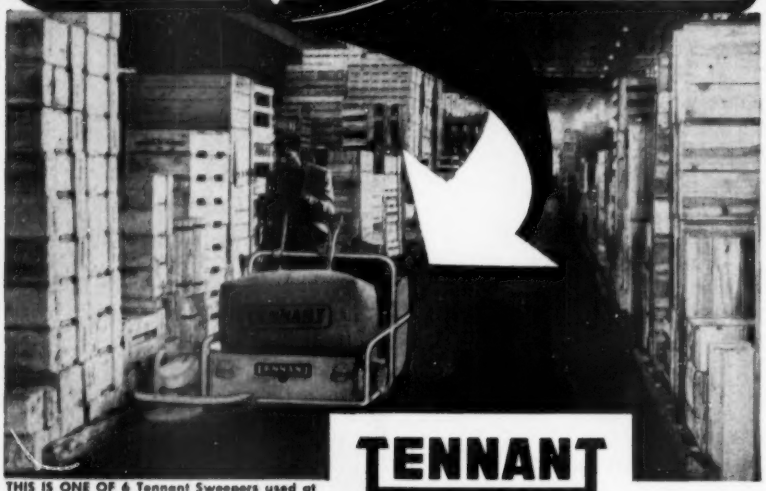
Call your P&H Dealer

P&H ELECTRIC HOIST DIVISION

HARNISCHFEGER CORPORATION

MILWAUKEE 46, WISCONSIN

it paid for itself in 22 days



THIS IS ONE OF 6 Tennant Sweepers used at Caterpillar. The first was bought 3 years ago.

TENNANT

POWER SWEEPER

THIS fast, heavy-duty TENNANT Power Sweeper cost $1985*... yet saved enough in manhours at Caterpillar Tractor Co. (Peoria) to pay for itself in 22 days.

These results were obtained in the Parts Department, where 12 men formerly swept aisles with push brooms. The saving, confirmed by time studies, amounted to more than 80 manhours per day.

CUTS COSTS IN MANY PLANTS

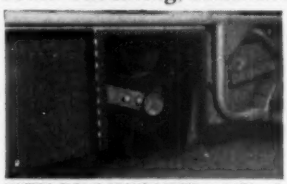
● **U.S. RUBBER** estimates mechanized sweeping can save up to $12,000 annually per machine. (They have 3 Tennant sweepers.)

● **PAN AMERICAN** Airlines save approximately 75% in manhours by sweeping their warehouse floors in Miami with a Tennant Model 36 Power Sweeper.

● **WHITIN MACHINE** report making a net saving of several thousands of dollars in 10 months with a Tennant Power Sweeper.

*Smaller models available.

LET US ESTIMATE savings possible in your plant through mechanized sweeping. No obligation. Phone, wire or write!



SWEEPS CLEAN AT HIGH SPEED as 36" brush spins inside "sealed-to-floor" compartment. 11" fan controls dust. Removable hopper.

TURNS "ON A DIME." Easy-steering; easy to handle. Forward or reverse on single pedal.

G. H. TENNANT CO.
2554 North Second St.
Minneapolis 11, Minn.

TENNANT Established 1870

Write for illustrated bulletins and performance data; specify 36" or 24' sweepers. Also get FREE 16-page booklet, "New Ideas on Plant Sanitation & Maintenance."

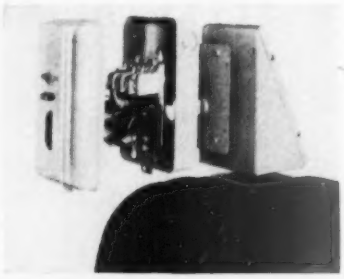
INDUSTRIAL FLOOR MACHINES

CREATORS OF THE TENNANT SYSTEM OF FLOOR MAINTENANCE—MANUFACTURERS OF EQUIPMENT AND MATERIALS FOR MAINTENANCE OF FLOORS, DECKS, ROOFS, HIGHWAYS

OFFICES IN PRINCIPAL CITIES

NEW ELECTRICAL EQUIPMENT

Begins on page 183



Easy-to-Mount Motor Starters

Here's a motor starter and contactor that can be mounted directly on the motor housing. Two types of adapters are available to allow positioning the starter at any angle.

Starter and contactor can be attached to the motor quickly to provide a safe, factory-type installation, the maker says. Above is shown an exploded view of the adapter and mounting when the outlet-pad face is horizontal.

Furnas Electric Co., 1032 McKee St., Batavia, Ill.

■

R-F Energy Shielding

A prefabricated shielding for blocking radio-frequency interference has been marketed. A portable unit, it is made of sheet copper panels to permit exposure to all weather conditions.

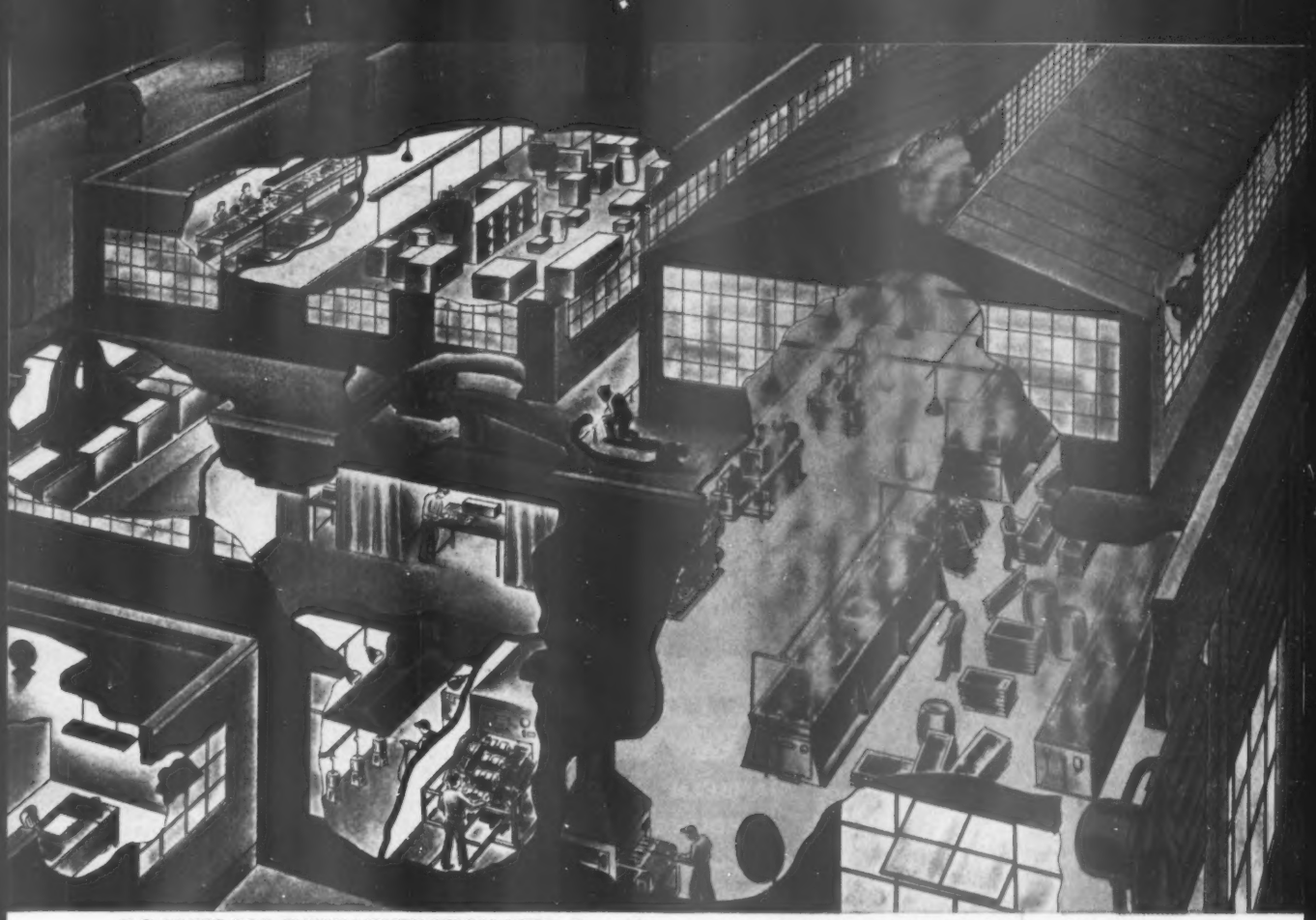
Easy to assemble or dismantle. Eight floor sizes are available. Air conditioning equipment and provisions for services are optional.

RFI Shielded Enclosures, Inc., 3634 N. Lawrence St., Philadelphia 40.

■

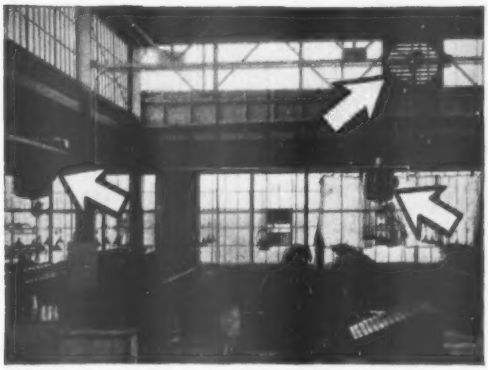
SPEED REDUCER with a reduction ratio of 3.04 to 1 has been announced by Turner Uni-Drive Co., 3400 Terrace St., Kansas City, Mo. Uni-Reducer offers an inexpensive method of converting electric motors to geared-type reducers, the manufacturer claims.

Turn the page



ILG UNITS FOR EVERY VENTILATION NEED. Portable floor fans for spot cooling . . . circulators and window ventilators for offices . . . self-cooled propeller fans and universal blowers for large-volume circulation – there's a standard ILG unit designed to provide efficient flow of cool, refreshing air wherever it's needed. And, you'll find them all conveniently available through your nearby Graybar office.

Make fresh air your partner in production



Unit heaters, infra-red drying units, and accessories are distributed by Graybar. Combined with an efficient ventilating system, you can be sure of even heat distribution during cold weather. Your Graybar Representative will furnish you catalog and quotation information to help you make up project specifications and cost schedules.

You can make your plant a healthier, more comfortable place to work through adequate ventilation. By removing fumes, heat, dust, and stuffy air with efficient ILG ventilating units, you'll cut worker fatigue . . . reduce costly accidents and material spoilage . . . speed production all around.

Graybar-distributed ILG fans and blowers are the best-designed and best-built units you can provide. Call your nearest Graybar office for a free survey of your ventilation requirements — we'll be glad to work with you or your electrical contractor in the selection of the ILG equipment best suited to the job.

Remember, Graybar is an all-inclusive source for *everything electrical.* We distribute over 100,000 electrical items for wiring, lighting, communication, power, as well as ventilation. *Graybar Electric Co., Inc. Executive Offices: Graybar Building, New York 17, N. Y.*

236-114

Call Graybar first for...

GraybaR Everything Electrical

IN OVER 100 PRINCIPAL CITIES

See how much more WHITING offers!

✔ **Increased Plant Capacity**—Whiting's multi-industry experience can help you get all the benefits of overhead handling. Whiting Trambeam makes building investment cost less . . . gives you more room for production, storage, assembly and shipping!

✔ **Lower Costs**—Whiting Trambeam is "tailor-made" for you from standard components. Use it alone or use it with other handling equipment.

✔ **Flexibility**—Crane or monorail—or both! Whether you want fast point-to-point transport or complete area coverage, Whiting Trambeam provides the important advantage of flexibility!

Other Whiting materials handling equipment: Overhead Cranes • The Trackmobile • Electric Chain Hoists

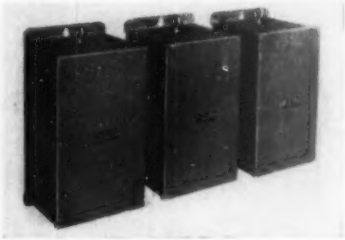
WHITING CORPORATION
15689 Lathrop Avenue, Harvey, Illinois

Send for this Folder!

See how Trambeam speeds work in six departments of the Euclid, Ohio plant of Reliance Electric and Engineering Company!

NEW ELECTRICAL EQUIPMENT

Begins on page 183



Lighting Transformers

These general purpose lighting transformers are designed for quicker and easier installation. They can be used indoors as well as outdoors.

Available in sizes from 1 to 15 kva., single- and 3-phase, and up to 600 volts. It has Class B heatproof, hi-dielectric, hi-heat insulation with polyester film.

Marcus Transformer Co., Hillside, N. J.

■

A PLASTIC ELECTRICAL TAPE marketed as Royalastic is being produced by the United States Rubber Co., 30 Rockefeller Center, New York 20. Has a dielectric strength of approximately 10,000 volts. Is not affected by sunlight, and has no corrosive effect on electrical conductors, the maker claims. It is resistant to water, acids, alkalis, and oils.

■

AN ELECTRONIC TIMER for intervals from 1/20 second to 4 minutes has been designed by Photoswitch Inc., 77 Broadway, Cambridge 42, Mass. This device provides for four types of timing, the producer claims.

■

WELDING CABLE CONNECTOR has been designed to eliminate the usual soldering required to attach an electrode holder to the cable, the maker says. This new device incorporates a screw clamping arrangement. Bernard Welding Equipment Co., 10222 Avenue N, Chicago 17.

Turn the page

MEET MR. LYON, D.D.S.*

*Dealer of Diversified Services

LYON'S national organization of steel equipment dealers serves virtually every segment of business and industry—with a diversified line of products totalling more than 1500 different standard items. (A very few are shown below.)

Factories, shops, warehouses, offices, churches, clubs, hospitals, homes—these are just a few of the many markets Lyon dealers serve with quality steel products.

Engineering and production facilities are also available for special contract work.

FACTORIES IN . . . AURORA, ILL., AND YORK, PA.

LYON METAL PRODUCTS, INCORPORATED

General Offices: 412 Monroe Avenue, Aurora, Illinois

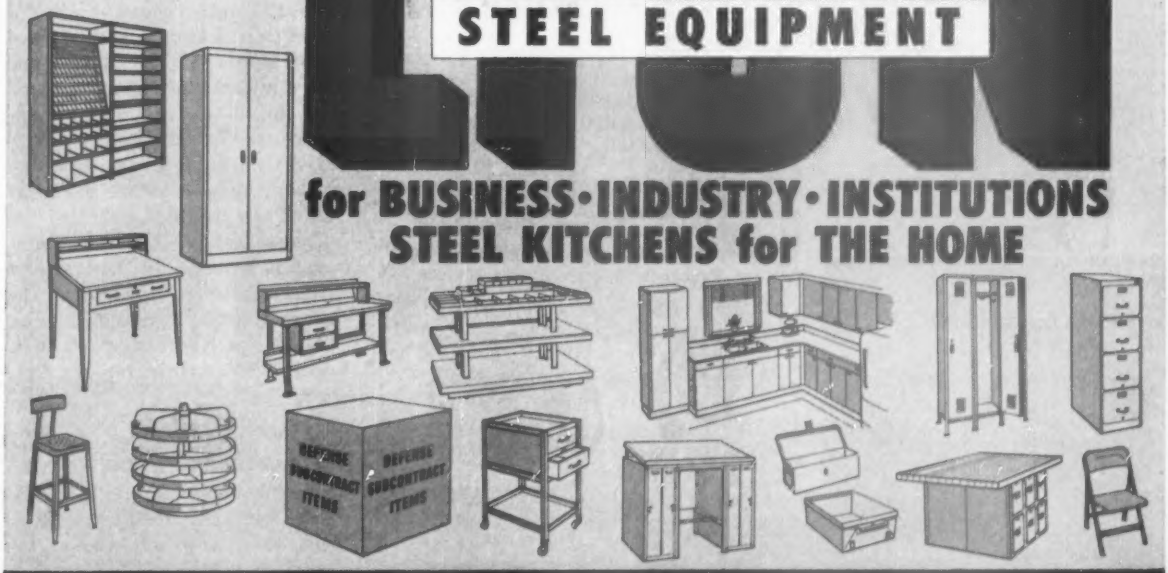
Sold Nationally Through Dealers and Branch Offices

LYON

STEEL EQUIPMENT

for BUSINESS • INDUSTRY • INSTITUTIONS

STEEL KITCHENS for THE HOME



A PARTIAL LIST OF LYON STANDARD PRODUCTS

• Shelving	• Kitchen Cabinets	• Tool Toters	• Economy Locker Racks	• Display Equipment	• Filing Cabinets	• Service Carts	• Tool Stands
• Lockers	• Cabinet Benches	• Bar Racks	• New Freedom Kitchens	• Flat Drawer Files	• Folding Chairs	• Sorting Files	• Shop Boxes
• Stools	• Storage Cabinets	• Tool Boxes	• Toolroom Equipment	• Revolving Bins	• Work Benches	• Drawer Units	• Tool Trays
• Bin Units	• Drawing Tables	• Parts Cases	• Wood Working Benches	• Hanging Cabinets	• Bench Drawers	• Hopper Bins	• Shop Desks

FOR YOUR VOICE OF ACTION

Femco

AUDIOPHONES
provide low cost
COMMUNICATION
ANYWHERE IN INDUSTRY

Efficiency is improved—production goes up, when Femco equipment is installed. You talk from control points to plant and between plant operations. As many mike-speaker stations as you need.

Other Femco Products of Merit include:

- Femco Communication Systems GET THINGS DONE faster - better - cheaper!
- Easy to BUY or LEASE
  Easy to INSTALL and USE
- DEMONSTRATIONS ARRANGED

Femco PAGEPHONES

Flexible inter-com and page systems

Femco PORTAPHONES

Movable as your work progresses

FARMERS ENGINEERING
& MANUFACTURING COMPANY
IRWIN, PENNSYLVANIA

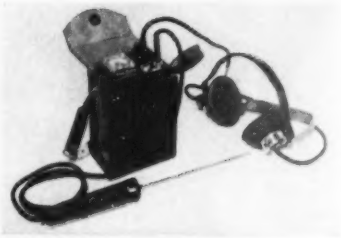
Ask for YOUR Femco Data Kit

Specialists in Electronic Communication and Control

WHAT'S NEW IN EQUIPMENT

Begins on page 162

MAINTENANCE TOOLS & SUPPLIES



Instrument Locates Machine Troubles

Noises indicating machine trouble can be located immediately with this portable electronic instrument. You will find it useful in pinpointing malfunctions in bearings, pistons, gears, ratchets, cams, clutches and other moving parts, the maker says.

The unit is known as the Elec-Detec Model V. It is equipped with a milliammeter for checking noise impulses visually and headphones for audible testing. With the detection aids the operator can hear as well as see the location of the trouble.

The accuracy of the milliammeter is assured by the use of a germanium crystal diode in the circuit, the manufacturer claims.

American Name Plate & Mfg. Co., 4254 W. Arthington St., Chicago.

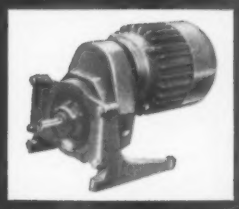
■

A SELF-ADJUSTING WRENCH to handle ¼- to 1¼-inch nuts is offered by Fuller and Hellmann, Inc., Moro, Ore. Knurled jaws of the wrench rotate about 130 degrees, open and close automatically, depending on direction of turn.

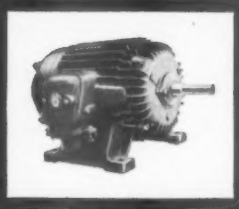
Turn the page

Superior Quality Makes Them The Best Buy In The Country

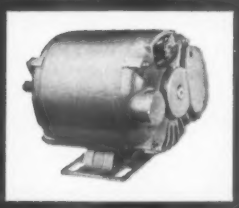
Vertical Hollow Shaft Pump Motor



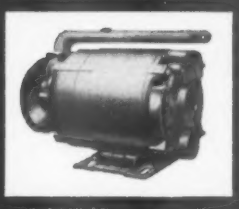
Geared Motor, "SADI"



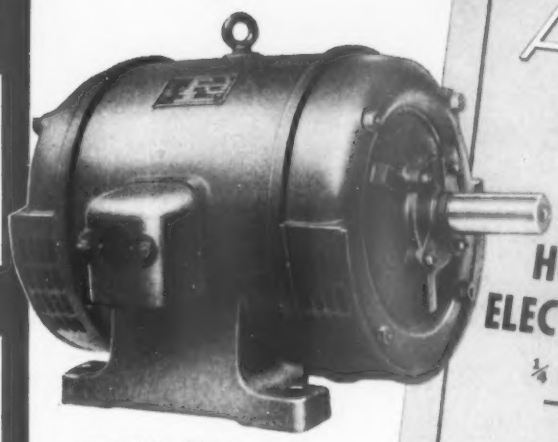
Totally Enclosed Fan Cooled Motor



Fractional Horsepower Motor



Industrial Sewing Machine Clutch Motor, "Super"



Open Drip Proof Motor

ACEC

FRACTIONAL and INTEGRAL HORSEPOWER ELECTRIC MOTORS

¼ hp. to 200 hp. —all available from stock

Priced below most other motors, ACEC motors offer you the electrical and mechanical excellence that results from over 70 years of experience and scientific research.

THREE-PHASE fractional and integral horsepower motors in ratings from ¼ hp. to 200 hp. are all available from stock. Branches and warehouses are located in New York, Chicago, Kansas City, New Orleans, Houston, Los Angeles—making possible immediate shipments out of warehouse inventories.

Manufactured strictly to NEMA FRAMES AND SPECIFICATIONS, ACEC Motors come in a wide variety of types to meet your motor needs. And 232 ACEC DISTRIBUTORS AND SERVICE SHOPS, located throughout the country, assure prompt and efficient fulfillment of your service requirements.

For top-level motor performance and utmost motor dependability *at lower prices*, write, wire or telephone our nearest representative—or communicate directly with us.

ALL ACEC MOTORS FULLY GUARANTEED

available in the following types:

- ★ **Open Drip Proof Motors**
- ★ **Totally Enclosed Fan Cooled Motors**
- ★ **Pump Motors**
  - **Style "C" Face Mounted**
  - **Style "P" Vertical Solid Shaft**
  - **Vertical Hollow Shaft**
- ★ **Industrial Sewing Machine Clutch Motors**
- ★ **Geared Motors and Capstans**

ACEC Motors

CHARLEROI

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Put Safety Brakes On Your Floors

with **VES-COTE**
FLOOR WAX

There is new safety in walking when floors are finished with Ves-Cote . . . because Ves-Cote contains a new and proven anti-slip agent, DuPont's "Ludox"* colloidal silica. These minute particles of "Ludox"* create excellent sole and heel traction—offer effective braking action for each step.

In addition to safety, Ves-Cote dries to a high lustre; is long-wearing; water resistant; easy to apply and dries quickly.

If you need safe floors, yet demand attractive floors—Ves-Cote is your answer.

*Trademark of E. I. Du Pont de Nemours & Co., Inc.

ANTI-SLIP PROTECTION

When you step on Ves-Cote, the weight of the foot forces the hard "Ludox" colloidal silica spheres into the wax particles, providing superior **braking action.** This way, Ves-Cote gives greater slip protection.

VESTAL ELECTRIC FLOOR MACHINE
Scrubs and polishes faster. Easy to operate. Safe. Exceptionally quiet. Sturdy, perfectly balanced construction.

BRITEN-ALL
A highly concentrated liquid cleaning compound for floors and woodwork. Briten-All is a neutral floor cleaner that cleans better, safer, easier—at lower cost.

Mail This Coupon TODAY!

VESTAL, INC., 4963 Manchester, St. Louis 10, Mo. Dept. F
☐ Have your Vestal representative demonstrate VES-COTE for me.
☐ Send me a FREE copy of FLOOR FACTS—A guide for treatment and maintenance of all types of floors.

NAME .....
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CITY ..... STATE .....

VESTAL
INCORPORATED
4963 Manchester
St. Louis 10, Mo.

NEW MAINTENANCE TOOLS & SUPPLIES

Begins on page 188

Pipe and Drain Cleaning Machine

Opening your clogged drains and supply lines is a 1-man operation with the new K-500 pipe and drain cleaner. The completely self-contained unit is offered with electric, gasoline, or compressed-air power units.

The K-500 drives up to 200 feet of sectional cable through any combination of traps and bends in a line from 1¼ to 12 inches, I.D. The speed of the cable is 700 rpm. A patented clutch provides quick starting, stopping, and reversing.

Kollmann Manufacturing Co., Erie, Pa.

■

Multi-Purpose Hand Tool

Called Champ by the maker, this hand tool cuts and strips insulation from wire, then crimps terminals and connectors to wires in sizes ranging from #10 to #22. The tool is also capable of shearing some bolts without leaving burrs to file.

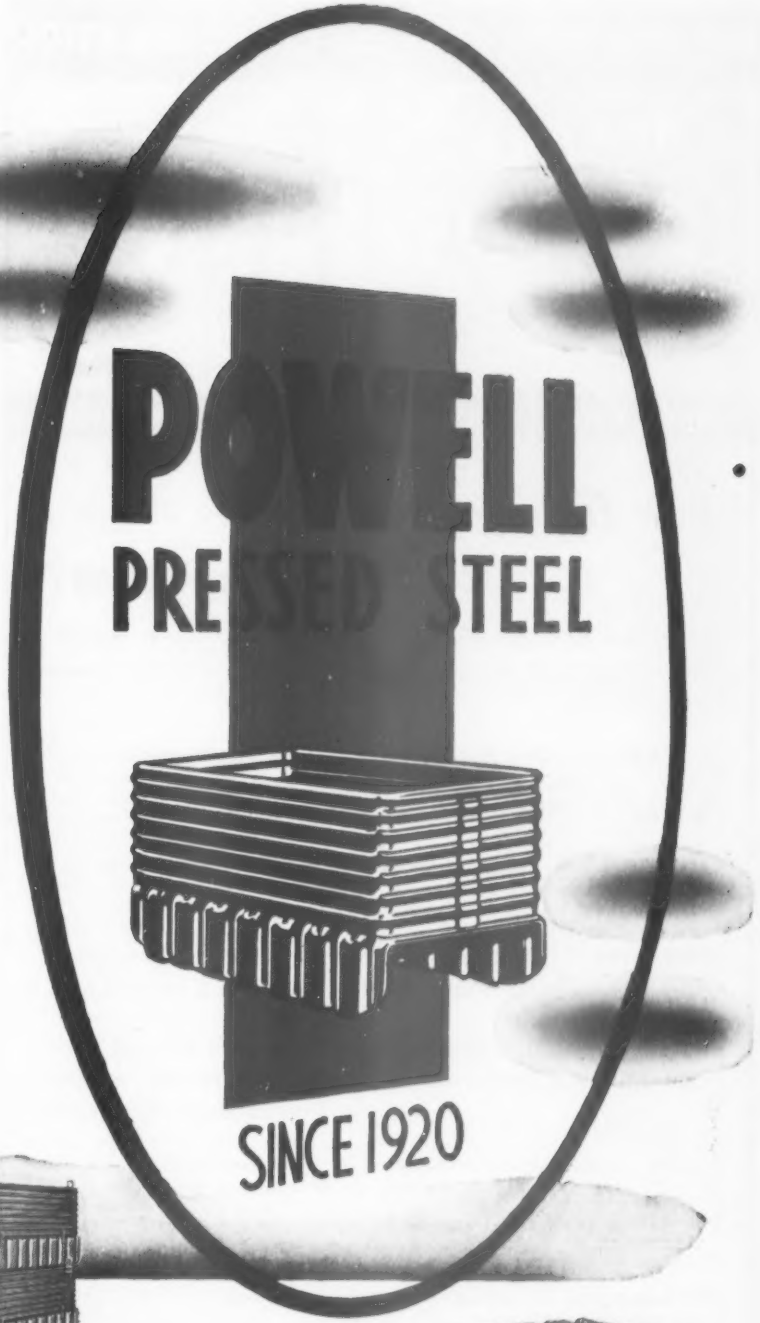
Aircraft-Marine Products, Inc., Harrisburg, Pa.

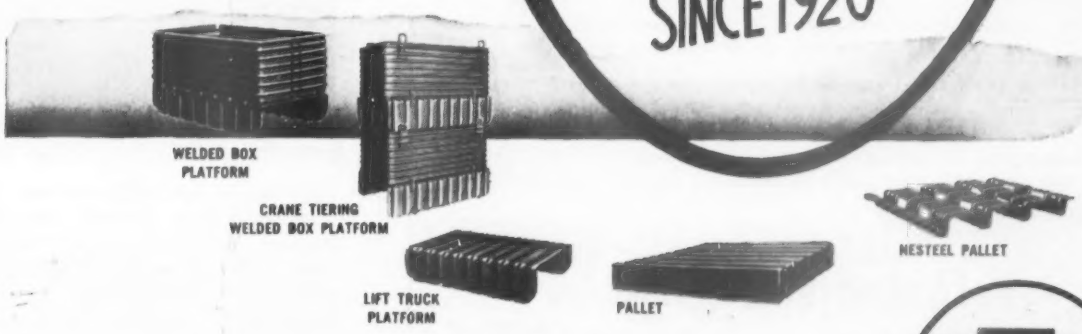
Turn the page

symbol of materials handling know how

Pioneer in the development of better materials handling methods, the Powell Pressed Steel Co., and their representatives throughout the United States, have spent more than 30 years designing, building, selling and servicing the most efficient line of boxes, pallets and platforms made. It was Powell who originated the modern cold formed steel equipment, and it was Powell who developed "built for the job" equipment that has done so much to lower handling costs.

When next you are in the market for handling containers of any description look for the symbol pictured here — it signifies the finest in product and service.





How Flexible Is Telescriber Communication?

Study the diagrams above and you will see that telescriber communication is as adaptable and as flexible as your needs demand.

1-WAY . . . . One transceiver writes to one receiver.

2-WAY [1] . . . . Two transceivers write to each other.

MULTIPLE [1] . . . . A transceiver writes to any number of receivers at the same time.

SELECTIVE [1] [2] . . . . A transceiver selects any one—or any group—of receivers to write to at a specific time.

INTER-COMMUNICATING [1] [2] . . . . Each transceiver on this system has full selectivity power to write to one, a group or all other transceivers in the system.

(1) A "lock-out" switch automatically prevents more than one message from being received on a receiver at the same time.

(2) Selector keys are required for Selective and Inter-Communicating systems.

For information concerning telescriber use in Production Control, Materials Handling, Quality Control, Maintenance Control, Work-in-Process Control, etc., write to Dept. B-34.

TelAutograph CORPORATION

16 West 61st Street • New York 23, N. Y.

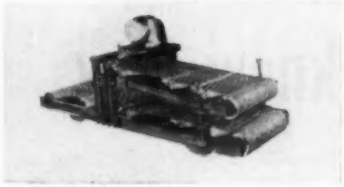
Telescriber TelAutograph * Service

*Trade-Mark

Instan-Form *

Begins on page 162

MATERIALS HANDLING



Bag Flattener

Flatten your paper and burlap bags and save warehouse and shipping space. Bags are passed between two power-driven conveyors of endless steel springs operating over grooved rollers.

This action flattens the bulk material in the bag. Machine is portable. It is 3½ ft. wide and 9½ ft. long.

Power-Curve Conveyor Co., Box 1146, Denver.

■

Free-Wheeling Bulk Scale

Eze-Move is a free-wheeling bulk scale that can be moved from one location to another with little effort. It consists of a large steel hopper mounted on a Fairbanks-Morse portable platform scale.

Materials can be discharged easily through a dump gate.

Burrows Equipment Co., 1316 Sherman Ave., Evanston, Ill.

Turn the page

HANDLING HELPS

by A.L.L.

No More Achin' Backs

The Lewis-Shepard Working Height Lifter is a natural addition to your mechanized handling system. Full

loads can be deposited onto it at floor level by your electric trucks. Smooth hydraulic action brings the work right up to working height by simple foot controls. No stoop . . . no strain . . . no fatigue! This equipment has unlimited possibilities, so be sure to write for details or call your local Lewis-Shepard representative.

Operating Ease . . . Built In

Try it and you'll see what we mean. All controls in the palm of your hand give more control, quicker application of speed, direction, brake, lifting

and lowering. Because all controls operate with handle in vertical position, you save 6" to 9" of aisle space. Braking is instant and smoother. Simply release your hand pressure for cushioned stops — with handle in *any* position, too. It's the Lewis-Shepard JackLift Electric Truck — the quality truck in the Walkie field — shown on the job at the G. E. River Works. Compare the JackLift Electric with other Walkie trucks and see for yourself! Write for free Comparison Chart. *Lewis-Shepard Products, Inc., 16-4 Walnut Street, Watertown 72, Mass.*

(Advertisement)

Efficient use of every cubic foot of space is more important than ever with today's high construction and operating costs. That's why Lewis-Shepard SpaceMaster Electric Fork Trucks are so popular with leading companies who have learned the tremendous economies of mechanized handling.

SpaceMasters are noted for their compact design and greater maneuverability. Aisle widths can be held to absolute minimums . . . valuable extra space put to work. And SpaceMasters have an enviable record of dependability under heavy duty operation.

At the General Electric Company River Works, for example, Lewis-Shepard SpaceMasters are used for transporting and stacking a variety of pallet loads up to 4000 lbs. Every day these trucks get in and out of places you'd never think possible, earning the praise of G. E. Plant Engineers for their combined ruggedness and maneuverability.

When you compare Lewis-Shepard Electric Trucks — feature for feature — you'll see why leading companies in every industry pick them. Their many unique design and engineering advantages, outstanding maintenance records, and greater dependability add up to the best dollar-for-dollar value on the market today. Want proof? Send for Comparison Charts and "Proof Folders" showing L-S Trucks on-the-job. Use coupon for convenience.

HERE'S MORE PROOF OF LEWIS-SHEPARD ELECTRIC FORK TRUCK DEPENDABILITY

Blue-Chip companies in these industries recently reordered L-S Fork Trucks:

Paper Mfr.	26 L-S in use — reordered	3
Elec. Gds. Mfg.	41 L-S in use — reordered	13
Grocery Chain	6 L-S in use — reordered	1
Paint Mfr.	1 L-S in use — reordered	6
Motor Transport	1 L-S in use — reordered	12
Auto Mfg.	4 L-S in use — reordered	1
Bottler	2 L-S in use — reordered	5

Nationwide Service — See "Trucks, Industrial" in your Yellow Phone Book

LEWIS-SHEPARD®

16-4 Walnut St., Watertown 72, Mass.

The "MASTER" Line

PLEASE SEND ME —

- **Proof Folders**
- **Model "M" Catalog**
- **Riding Type Electric Truck Comparison Chart**

Name .....

Company .....

Street .....

City ..... State .....

let 'er go, skipalong,
stick with the "K" brand you know

"Maverick" usually spells trouble, on the production line as well as out on the range. Being an unknown quantity or a "Johnny-come-lately," it leaves room for genuine doubt both as to performance and to quality. And that's the reason so many experienced buyers—production experts to supervisors—insist on Kester . . . the one "brand" that is synonymous with the best in solder and solder products.

Insist on Kester for the exact job-engineered Solder you require; 8 major Fluxes in Core Solder, available in 5 core openings. Also . . . Kester Solid Wire and Bar Solder, Kester "Solderforms" and Kester Fluxes.

KESTER

SOLDER COMPANY

4213 WRIGHTWOOD AVENUE • CHICAGO 39, ILLINOIS
NEWARK 5, NEW JERSEY • BRANTFORD, CANADA

MATERIALS HANDLING EQUIPMENT

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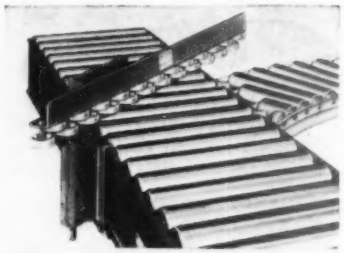

Diverting Rail for Roller Conveyor

Loads can be switched from a live roller conveyor to a spur by this diverting rail. Clamp attachments make it easy to relocate.

The diverting rails can also be remotely controlled for guiding items to any one of a series of spurs.

Metzgar Co., 438 Douglas St. N.W., Grand Rapids, Mich.

■

Adjustable Angle Belt Conveyor

Here is a belt conveyor which will permit you to load balconies, mezzanines, and upper levels. The Speedlift, Model SLJ-40, is portable and can be adjusted to operate at any angle, the maker claims.

Equipped with a wrench and cable to facilitate setting the angle of operation, the belt movement is reversible. The unit is available in various lengths with various belt widths.

Speedways Conveyors, Inc., 1241 Niagara St., Buffalo 13, N. Y.

Turn the page

Pressur-Forming

ASSURES A BETTER FIT, GREATER STRENGTH, LONGER LIFE

ALLEN'S specialized and perfected method of cold forging Allenoy steel produces the tremendous strength, fatigue resistance and precision that made Allen the *Number One* name in socket screws. Full "pressur-forming" preserves the tough Allenoy fibers continuous, uncut and concentrated where strength is needed most . . . conforming to the contours of screw head, socket and threads.

ALLEN PRESSUR-FORMING pays off in precision screws that you can count on to speed assembly, stand up better under continued hard usage. To be sure you get the advantage of "pressur-forming"—just remember to get genuine Allens, the easy name to remember because Allen *stands* for socket screws. The leading Industrial Distributor in your area stocks a complete line.

Allen 'pressur-formd' cap screws are standard stock items in sizes from No. 4 thru 1 in. Flat head cap screws, No. 4 thru ¾ in. Both N. C. threads. Many sizes are also standard in stainless steel, or in Allenoy steel with N. F. threads.

Pangborn Dust Control *pays for itself* in recovered material

at Thomas A. Edison, Incorporated

UNLOCKING JIG in nickel-loading department. Down-draft table (note perforations) recovers nickel dust.

MANUFACTURING nickel-iron-alkaline storage batteries at Thomas A. Edison, Incorporated, creates nickel, nickel-hydrate, and iron-oxide dusts. Control and recovery of these valuable dusts was complicated by their light weight, which in some processes prevented the use of regular dust-collecting hoods. Pangborn engineers solved this problem by utilizing down-draft tables in a unique dust control system geared to Edison's particular requirements.

RESULTS? The Pangborn system pays for itself in recovered dust alone. In addition, the dust-free atmosphere has improved working conditions in the plant. Although this Pangborn dust control system is a major installation, it was completed without loss of a single day's production!

WHAT ARE YOUR DUST PROBLEMS? Find out how Pangborn can help you. Mail the coupon below today for Bulletin 909-A.

Look to Pangborn for the latest developments in Dust Control and Blast Cleaning equipment

Pangborn DUST CONTROL

STOPS THE DUST HOG from stealing profits

PANGBORN CORPORATION, 2100 Pangborn Blvd., Hagerstown, Md.

Gentlemen: Please send me a copy of Bulletin 909-A.

Name.....

Firm.....

Address.....

City..... Zone..... State.....

MATERIALS HANDLING EQUIPMENT

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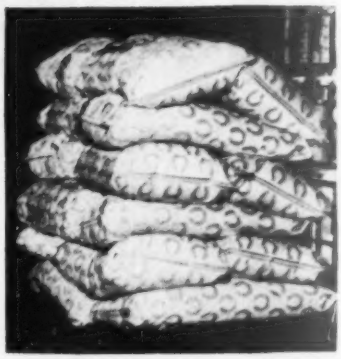


Non-Skid Bag

A special coating on the exterior of the Non-Skid Multiwall bag makes for easier, safer handling. It will help reduce breakage caused by bags falling from fork trucks and stacks, the manufacturer says.

Furthermore it reduces the likelihood of load shifting in transit. Coating is transparent.

Union Bag and Paper Corp., 233 Broadway, New York 7.

■

Automatic Couplers

These automatic couplers make it easier to pick up and release loads. Units can be fastened to trucks and tractors.

The couplers can be either hand- or foot-operated and employ a spring activated or ball-type lock.

Towmotor Corp., 1226 E. 152 St., Cleveland.

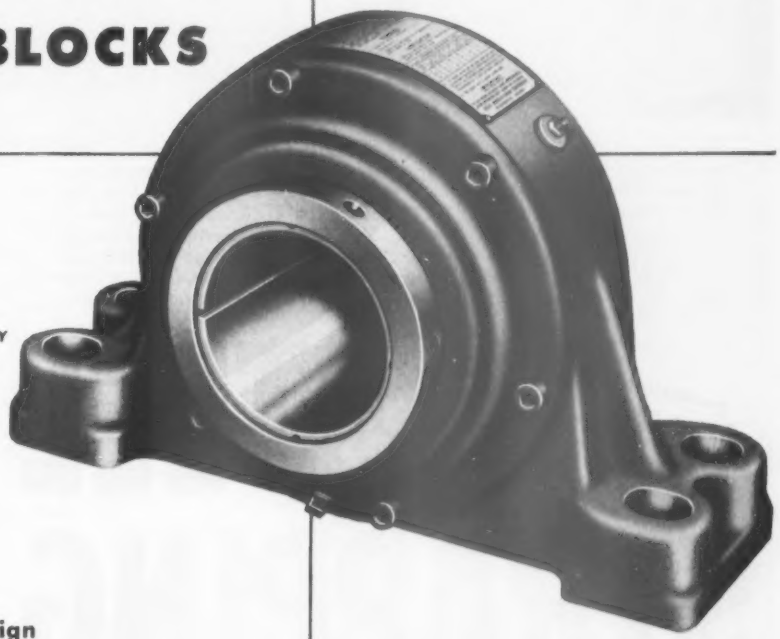
Turn the page

NEW

DODGE-TIMKEN ALL-STEEL PILLOW BLOCKS

HEAVY DUTY CAPACITY!

LESS SPACE! LESS WEIGHT!



A JOINT ENGINEERING DEVELOPMENT BY DODGE AND THE TIMKEN ROLLER BEARING COMPANY

- All-Steel construction
- A new Timken bearing design
- High radial and thrust capacities
- Compact—minimum dimensions
- Minimum weight with maximum strength
- Fully self-aligning with spherical outer race
- Both expansion and non-expansion types
- Adapter mounting, proven through the years
- Double piston ring seals
- Sealed both on and off the shaft
- Fully assembled, permanently adjusted, lubricated and sealed at the factory

Here are the bearings for industry's toughest jobs. High radial and thrust capacities. Stamina to take heavy shock loads. And all-steel construction packs this load-carrying capacity into less weight and less space. Engineers are already specifying "Dodge-Timken All-Steel" for some of America's largest projects. Write for details and delivery dates, or call your Dodge Distributor.

DODGE MANUFACTURING CORPORATION
400 Union Street, Mishawaka, Indiana

CALL THE TRANSMISSIONEER your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new cost-saving methods. Look for his name under "Power Transmission Equipment" in your classified phone book.

DODGE
of Mishawaka, Ind.

NAME PLATES

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY, CHICAGO THRIFT-ETCHING CORPORATION, 1555 SHEFFIELD AVENUE, CHICAGO 22, ILLINOIS

Packaging costs were reduced by as much as one-fourth when the Fafnir Bearing Co. adopted the Stanley Steel Strapping System.

In almost every type of plant—with almost every type of product—substantial savings are being made in packaging and handling by this cost-cutting system. Put it to work for *you*. Call in the Stanley Packaging and Shipping Engineer. He'll install the Stanley Steel Strapping System on a 30-day trial. There's no obligation. Just mail the coupon. Branch Offices or Representatives in 32 principal cities.

STANLEY Reg. U.S. Pat. Off. STEEL STRAPPING SYSTEM*

*A MAN thoroughly experienced in steel strapping applications — the Stanley Packaging and Shipping Engineer

A METHOD adaptable to any requirement — the Stanley Steel Strapping System

See us at Booth 1009

5th NATIONAL MATERIALS HANDLING EXPOSITION MAY 18-22, 1953 PHILADELPHIA

HARDWARE • TOOLS • ELECTRIC TOOLS • STEEL STRAPPING • STEEL

THE STANLEY WORKS, Steel Strapping Division
201 Lake St., New Britain, Conn.

☐ Yes — the 30-day trial interests me. Have the Stanley Packaging and Shipping Engineer call.

☐ Send me complete information about the Stanley Steel Strapping System.

(Please write name and address in margin of page)

MATERIALS HANDLING EQUIPMENT

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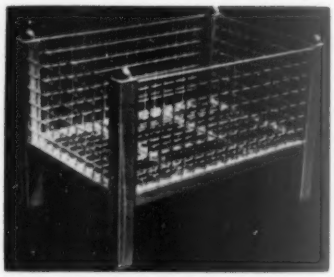

Stacking-Type Materials Box

This materials handling box is constructed of wire fabric to decrease weight and allow for ventilation and drainage. Wire is welded at each intersection. Steel tube is used for the bottom frame and corner uprights.

Tiering to save floor space is facilitated by stacking caps on the corner posts. Box is available in various sizes with different meshes depending upon requirements. Lifting hooks for crane handling are optional.

Equipment Manufacturing, Inc., 21550 Hoover Rd., Detroit 5.

■

Double-Ended Stackbins in Racks

It is now possible to service your employees on two assembly lines with double-ended stackbins. Materials and components are readily accessible to operators from either side.

Bins and racks are made of steel and can be relocated easily.

Stackbin Corp., 1129 Main St., Pawtucket, R. I.

■

EXPAND-O-VEYOR is a completely adjustable conveyor made by the Farquhar Division of the Oliver Corp., 142 N. Duke St., York, Pa. The unit can be adjusted both horizontally and vertically for almost any requirements. Furthermore, it can be set for certain angles in either direction.

Turn the page

Air-Cooled Models
in capacities up to 144 c.f.m. displacement
Bulletins AC-8 and AC-10

GARDNER-DENVER SINCE 1859

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd.,
14 Curity Avenue, Toronto 13, Ontario

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

Quaker

CONVEYOR BELTING

Round the clock production! It's yours with Quaker belting for long hauls, short pulls, tough loads or steep inclines. Carefully engineered and rigidly pretested for exceptional resistance to high flexing, tension and wear. Tough, highest quality rubber encloses desired number of friction plies uniformly tensioned for safe overall shock absorption. In any desired weight or cover thickness for wet or dry conveying.

Write for name of nearest Quaker distributor.

Belting, Hose, Packing and Moulded Rubber of every construction for every need

QUAKER RUBBER CORPORATION
DIVISION OF H. K. PORTER COMPANY, INC.
OF PITTSBURGH
PHILADELPHIA 24, PA.
Branches in Principal Cities

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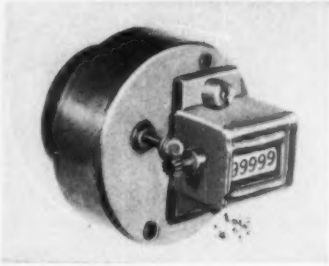
MEASURING & CONTROL



Elapsed-Time Meters

Indicates hours of operation of equipment. These indicators can be installed either in a control panel or on the unit.

Can be used to facilitate periodic inspection, lubrication, and maintenance of machines. Will count up to 99,999 hours.

Vocaline Co. of America, Inc., 100 Coulter St., Old Saybrook, Conn.

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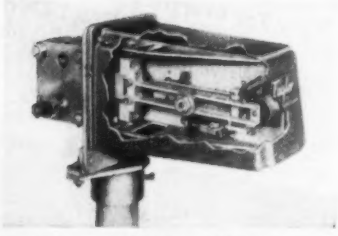


Instrument Simplifies Flow Measurement

This instrument was designed especially to solve the problem of close-coupled flow measurement of liquid, steam, and gas. It can also be employed to determine liquid level and specific gravity.

The Transaire Transmitter is composed of a differential pressure sensing device and a transmitting system.

Taylor Instrument Companies, 95 Ames St., Rochester 1, N. Y.

Turn the page

You get ALL these Features when you buy PET Drills!

Reserve Power—for the extra-tough job. Powerful, Continuous-Duty Motors—built in PET's own factory. Dynamically Balanced Armatures—for freedom from vibration.
Six Heavy-Duty Ball and Needle Bearings.
Compact Design—makes hard-to-reach drilling jobs easier and faster.
Aluminum-Alloy Die Castings—for light weight, easy handling.
Forced Ventilation—for cool running.
Precision-Cut, Heat-Treated Gears—for smooth, quiet power flow.

If you want the *best* for your maintenance or production work, take an extra look at the PET Superduty Drill shown here. Check its features! Here's a drill that's made for heavy, continuous duty...with *plus* power per pound . . . built to *work* right and *handle* right on the job.

Normally you might expect to pay extra for such features—in the form of "optionals" that jack up your cost. But that's not true of PET Drills! All these features are standard in the PET Superduty line . . . *and they're available to you at a standard drill price!* That's why the coupon below can save money for you. For free catalog and name of your nearest PET distributor, *mail it today!*

NOW...you can get the RIGHT DRILL for YOUR job!

PET Superduty Drills are available in 54 distinct models and 3 capacities: ¼", ⅜" and ½". Your choice of pistol or saw-type grip. With such a broad line, you don't have to compromise on a drill that's "almost" right! You can choose *exactly* the drill you need for your job. The PET Superduty line includes drills meeting U. S. Government and military specifications.

PET® POWER TOOLS

Plus Power per Pound

PORTABLE ELECTRIC TOOLS, INC.

320 West 83rd Street, Chicago 20, Illinois

In Canada: Portable Electric Tools, Ltd., 452 Birchmount Road, Toronto 13, Ontario, Canada

MAIL COUPON FOR FULL INFORMATION

PORTABLE ELECTRIC TOOLS, INC. FM-43
320 W. 83rd St., Chicago 20, Ill.

Gentlemen: Please send us free copy of your PET Superduty catalog, and name of nearest distributor.

*Name*_____ *Title*_____

*Company*_____

*Address*_____

*City*_____ *State*_____

HE PROBABLY THINKS SHE'S AS BEAUTIFUL AS AN ANSUL FIRE EXTINGUISHER..
..YEA..BUT HE'LL FIND SHE'S NOT NEARLY SO EASY TO HANDLE!
ANSUL
J.A. CORMACK

SEE PAGE 242

Executives...

THIS is for **YOU!**

It's New! It's Ready! It's Proved!

KELLOGG Select-O-Phone

THE INSIDE VOICE OF BUSINESS

with the **NEW EXECUTIVE STATION!**

EXCLUSIVE WITH KELLOGG —SELECT-O-PHONE, with the new EXECUTIVE STATION—with automatic dialing and ringing—handles communications between top executives and between departments, *independently of city telephone service—and releases switchboards for incoming and outgoing calls!* (In addition, the SELECT-O-PHONE privacy handset is included.) It will save you money—send coupon for particulars!

KELLOGG An Associate of International Telephone and Telegraph Corporation

SELECT-O-PHONE DIVISION,
Kellogg Switchboard and Supply Co., Dept. 12-D
79 West Monroe Street, Chicago 3, Illinois

Please send complete information on Kellogg SELECT-O-PHONE Systems.

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

MEASURING & CONTROL EQUIPMENT

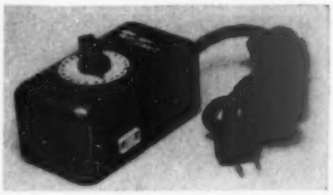
Begins on page 200

For Static Testing in Hazardous Areas

For hazardous atmospheres you can use Model #269 Vibrotest to detect static electricity discharge from floors, personnel, and equipment. Meets latest National Fire Protection Assn. recommendations for electrical resistance tests of conductive materials, maker says.

Associated Research, Inc., 3758 W. Belmont Ave., Chicago 18.

■



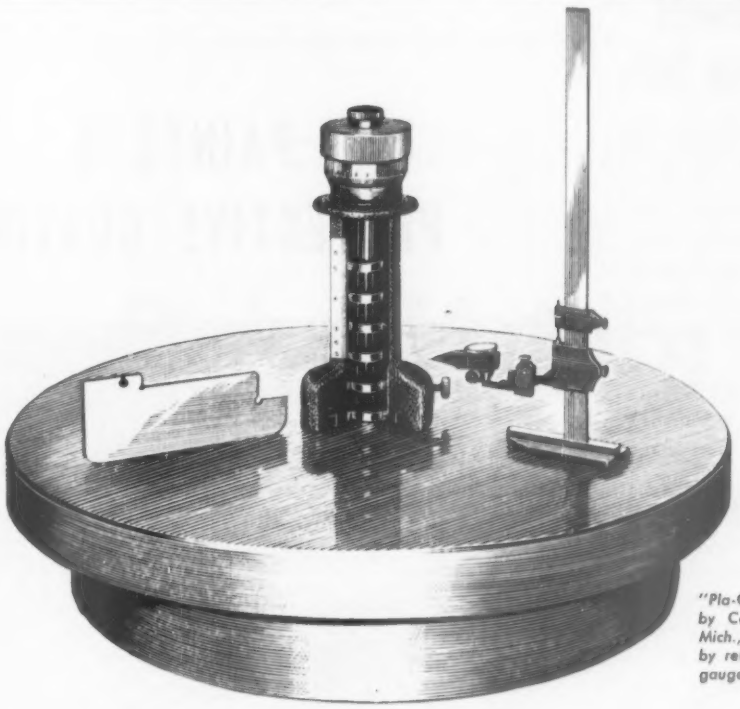
Electric Timer

This electric timer has a rating of 1650 watts for electric heating pots, tumbling machines, small baking ovens, air conditioning, and humidifiers. And it's reasonably priced.

Model 2T-20 can be pre-set to turn on or off equipment up to 20 hours ahead. Designed for use with 105-120 volt, 50-60 cycle current, but can be wired in or adapted for other voltages.

Vocaline Co. of America, Inc., 34 Coulter St., Old Saybrook, Conn.

Turn the page



"Pla-Chek" gauge (center) built by Cadillac Gage Co., Detroit, Mich., is permanently stabilized by refrigeration. It checks profile gauge at left.

Frozen steel insures accuracy of gauges ... saves time in making them

CAN MODERN REFRIGERATION ALSO HELP YOUR BUSINESS?

Tool steel used in making gauges accurate to .00005 inch (half a ten-thousandth) has to be perfect. Its production involves some pretty tough treatment. For example, to insure permanent accuracy such steel is put through five separate heating-freezing cycles in fairly rapid succession. Temperatures range from plus 300°F. to minus 100°F.

The process stabilizes the metal in a matter of hours and prevents its further "growth," eliminating natural aging over as much as two years. It insures dependable performance of delicately built instruments. It reduces risk of metals cracking under precision grinding operations.

Refrigeration equipment used in this intricate process of aging contains "Freon" refrigerants. These create exacting temperatures required in a variety of manufacturing procedures. "Freon" refrigerants are widely used in industry, too, because they are entirely safe . . . nonflammable, nonexplosive, virtually nontoxic. They're ideal for all types of industrial applications.

Why not check with your own engineers? Ask *them* how modern refrigeration (and air conditioning, too), might further serve your company's interests. Could be . . . both refrigeration and air conditioning might contribute substantially toward reducing costs . . . saving time . . . increasing production . . . upping profits in your plant . . . boosting morale. An interesting book, "How Air Conditioning and Refrigeration Benefit Industry," illustrates a number of practical applications. Write for it. E. I. du Pont de Nemours & Co. (Inc.), "Kinetic" Chemicals Division, Wilmington 98, Delaware.

"FREON" SAFE REFRIGERANTS

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
... THROUGH CHEMISTRY

KINETIC
REG. U. S. PAT. OFF.

"Freon" is Du Pont's registered trade-mark for its fluorinated hydrocarbon refrigerants.

Manual Lincolnweld cuts welding time 50%

FASTER welding speeds now possible with "Manual Lincolnweld" can lower welding costs substantially on a wide variety of work. On these truck bodies, for example, higher welding speeds cut welding time in half. Welds are of higher quality. Less time is needed for weld cleaning.

To simplify operations, the work is held in a positioner permitting most welds to be made in downhand position at currents of 400 amps. The material is mostly ½" plate and 5/16" channel.

The high current density of "Manual Lincolnweld" (up to 600 amps on a 7/64" wire) is 3 to 4 times higher than that used on any arc welding process today. This results in deeper penetration, permits 100% butt welds in ¼" plate in one pass from each side without need for joint preparation, saving manhours and lowering shop costs.

Fig. 1. Truck body *in fabrication on positioner permits operator to make welds on bottom of truck as well as on inside.*

Fig. 2. Manual Lincolnwelding *bottom sections to end at 400 amps. Continuous electrode is fed through welding gun which also supplies granular flux to hide arc rays. Photos courtesy Easton Car and Construction Company, Easton, Pa.*

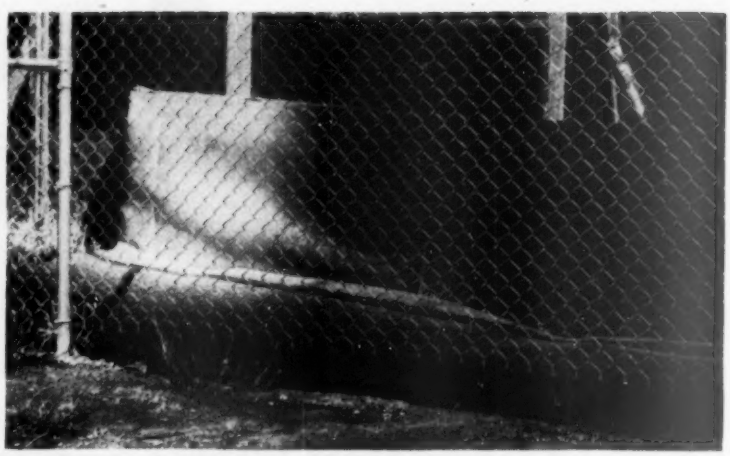
GET THE FACTS—Latest procedures for cutting costs with "Manual Lincolnweld" are in Bulletin 1303. Write on your letterhead to Dept. 3702.

THE LINCOLN ELECTRIC COMPANY
Cleveland 17, Ohio

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

WHAT'S NEW IN EQUIPMENT . . . *Begins on page 162*

PAINTS & PROTECTIVE COATINGS



Non-Splattering Aluminum Coating

Here's a corrosion-resistant aluminum paint, called Roylac, with controlled overspray. This means it will not mark objects four feet away, the producer claims. Picture above shows fence with tarpaper four feet behind that has been sprayed with Roylac, right, and regular high-grade aluminum paint, left.

Roylac contains special agents that cause it to dry within four feet of travel after being released from the spray gun. It then falls away to a dry, non-adhering powder.

Royston Laboratories, Inc., Blawnox, Pa.

■

Plastic Coating for Insulations

Insulcolor is the name of this new plastic coating for insulated equipment. In addition to giving added protection to the insulation, this coating can be used for color identification.

Available in white and six colors, Insulcolor is capable of withstanding temperatures up to 160 F. without cracking, shrinking, or crazing, the maker says. It is resistant to bumping and abrasion. Because of high water-repellent properties it is suitable for inside or outside application. Either brush or spray can be used to apply Insulcolor. When dry, it is fire-retardant, the manufacturer claims.

Armstrong Cork Co., Lancaster, Pa.

Turn the page

To keep going longer... replace with

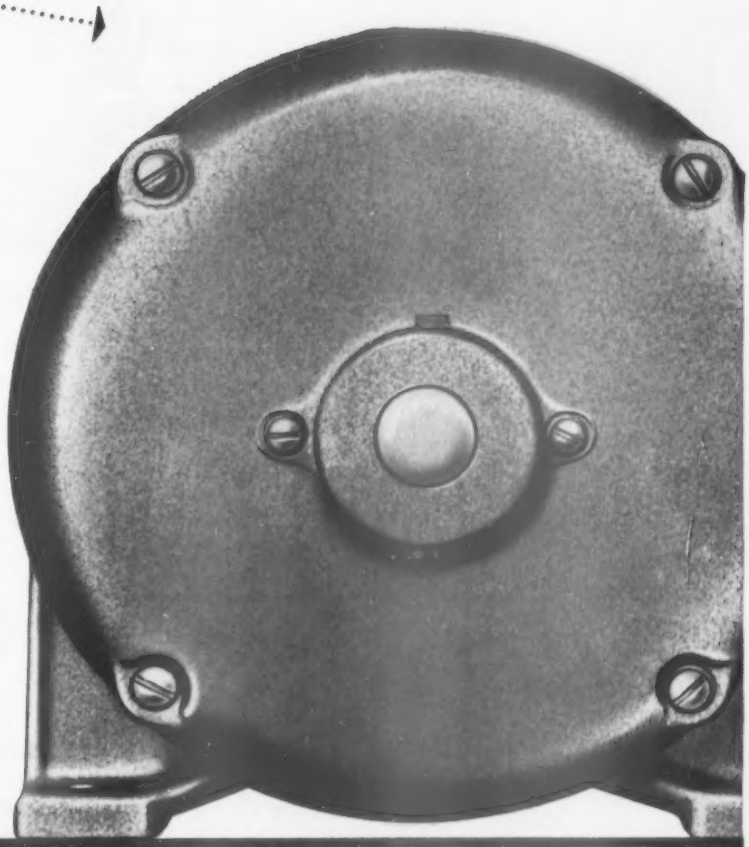
Delco Motors

When conditions are the most severe, Delco motors prove their worth. The high standards that guide their design, engineering and construction insure the extra endurance that minimizes servicing and down-time.

Delco replacement motors are available fast, from your local Delco motor distributor.

THERE'S A DELCO
FOR PRACTICALLY ANY
INDUSTRIAL APPLICATION

Open and enclosed motors up to 100 h.p. for standard foot mountings. NEMA C&D flange-mounted motors up to 30 h.p. Explosion-proof motors up to 20 h.p.



DELCO PRODUCTS

Division of General Motors Corporation, Dayton, Ohio

A GENERAL MOTORS PRODUCT — A UNITED MOTORS LINE

DISTRIBUTED BY WHOLESALERS EVERYWHERE

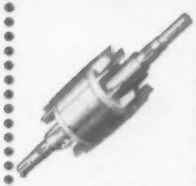
THESE FEATURES KEEP DELCO MOTORS GOING LONGER

Water-Tight Conduit Box. Protects against moisture.

Positive Lubrication. Lengthens bearing life.

Delcote Insulation. Permanently flexible, moisture-proof, wear resistant.

Positioned Bearings. Maintain shaft alignment.



Dynamically Balanced Rotor and Shaft Assembly. Reduces vibration.

Corrosive-Resistant Cast Iron Frame. More solid, more rugged.

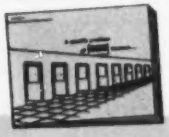
SALES OFFICES: Atlanta • Chicago • Cincinnati • Cleveland • Dallas • Detroit • Hartford • Philadelphia • St. Louis • San Francisco

Generalift
★ ★ ★ ★ ★

PALLET BOXES

1. CUT MATERIALS HANDLING COSTS
2. SHARPLY REDUCE STORAGE COSTS

Write for your FREE copy of "The General Box." It shows how to Cut Packing and Shipping Costs.



General ★★★★★ BOX COMPANY
GENERAL OFFICES: 1807 Minor St. Des Plaines, Ill.

DISTRICT OFFICES AND FACTORIES: Cincinnati, Denville, N. J., Detroit, East St. Louis, Kansas City, Louisville, Milwaukee, Sheboygan, Winchendon. General Box Company of Mississippi, Meridian, Miss. Continental Box Company, Inc., Houston, Dallas

ENGINEERED SHIPPING CONTAINERS FOR EVERY SHIPPING NEED
• Wirebound Crates and Boxes • Generalift Pallet Boxes • Generalite Beverage Cases
• Cleated Corrugated and Watkins Type Boxes • All-Bound Boxes • Corrugated Boxes

Begins on page 204

Neoprene-Base Coating System

NeoCoat and NeoPrime are the neoprene-base paints used in this anti-corrosion coating system. In three coats these paints will build up a thickness of 5 mils, which the manufacturer considers necessary for optimum corrosion resistance and good service characteristics.

Different formula mixtures of this paint are available for the coating of all surfaces, including concrete. The maker says this covering is especially effective in the coating of welds, beads, seams, and edges where many other paints fail. A planned system for inspecting and repairing has also been developed.

Pennsylvania Salt Manufacturing Co., 1000 Widener Bldg., Philadelphia 7.

■

BAROMIX, A DRY PAINT POWDER that can be mixed with kerosene and applied with either brush or spray gun, has been developed by the Berry Asphalt Co., Magnolia, Ark. It is resistant to weather, smoke, fumes, and soil acids, and will not flow on vertical surfaces at temperatures up to 325 F.

■

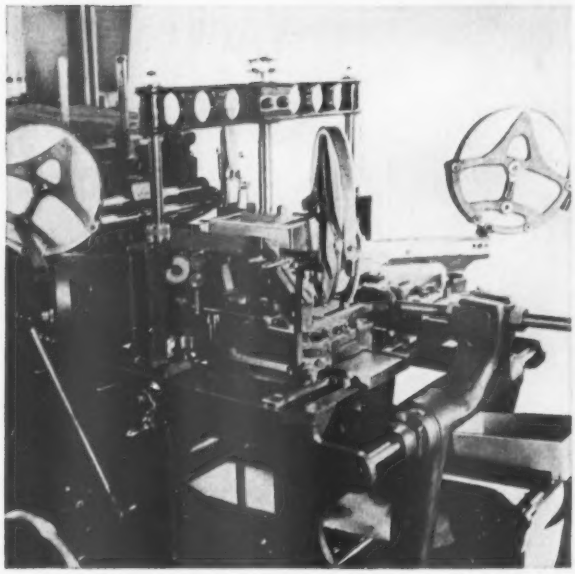
CHEMICAL-RESISTANT WHITE GLOSS PAINT for walls and ceiling, with a synthetic rubber base, can be obtained from the Tropical Paint and Oil Co., Cleveland. This fast-drying paint is said to resist attack by moisture, grease, chemical fumes, and caustic cleaners.

■

RUST-INHIBITING PAINT, Mop-Kote, will give 10 years protection from a single 2-coat application, the manufacturer claims. The paint has been subjected to a 10-year accelerated test in a salt air climate. Made by Eagle Chemical Co., Joliet, Ill. (Paint-2)

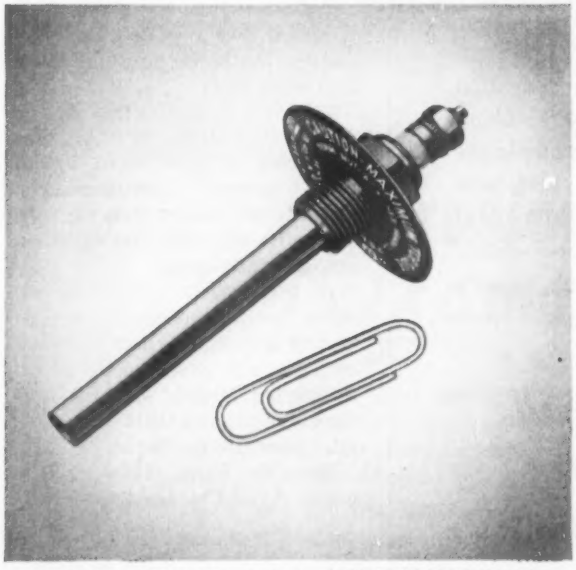
Turn the page

Mighty Midget THERMOSWITCH® Unit bosses temperature in tight spots



1. THE HEAT'S ON in this box making machine — heat-sealing box corners. Speed of boxes passing through determines desired temperature. Four Fenwal Midget THERMOSWITCH units control the four heaters precisely — yet must do their work in very tiny space. Only Fenwal Midgets could do it!

2. SHOULD OVERHEAT OCCUR in this transport plane's cabin heater the Fenwal Midget THERMOSWITCH Thermostat would detect it instantly and positively. It snuggles into a tiny space — the heating system's fuel accessories box; measures only ¼" diameter by 3⅛" but does its job like a Marine.



3. THE SHELL TELLS ALL on a Fenwal THERMOSWITCH because the shell itself is the heat-sensitive element. It expands or contracts instantly when a temperature change occurs, opening or closing electrical contacts. It is rugged, resistant to corrosion and vibration, compact and always dependable. This is why they are in use on so many control and safety devices.

4. FOR FREE BULLETIN on Fenwal Midget THERMOSWITCH units just write. It gives detailed information and engineering specifications on this new versatile THERMOSWITCH unit for use in confined spaces. Fenwal engineers are glad to assist on your application problems. **Write Fenwal, Incorporated, 64 Pleasant St., Ashland, Mass.**

Fenwal

THERMOSWITCH®

Electric Temperature Control and Detection Devices

SENSITIVE... but only to heat

Always SWIVEL and ROLL

Always SWIVEL and ROLL

Free Manual

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Casters & Wheels

Can Help You Save Time and Money

Darnell Casters and Wheels start cutting costs from the very first day of installation. Easy rolling and swivelling increase employee efficiency, save floors and help add to production. With over 4000 types of casters and wheels to select from you can specify the exact model to meet your requirements.

Specify Darnell for Complete Satisfaction

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DOWNEY, (Los Angeles County) CALIF.

60 Walker Street, New York 13, N.Y.
36 North Clinton, Chicago 6, Illinois

WHAT'S NEW IN EQUIPMENT

Begins on page 162

VALVES & FITTINGS

Dual 3-Way Valve for Mechanical Presses

"Repeats" due to valve failure on mechanical presses controlled by air-operated clutches and brakes are made practically impossible by this dual 3-way air valve, the maker says. The valve is called the P-M Series BB-5 and is available only in ¾-in. iron pipe size.

The two 3-way valves are in parallel in a common body. For the press to close both valves must operate simultaneously. Should one valve reverse, the unit will "fail safe" and the press automatically stop.

In the electric circuit of the press, the dual solenoids are connected in parallel, and the pilot sections are interlocked pneumatically. If one solenoid fails the valve will not build up enough pilot pressure to operate.

Hannifin Corp., 1158 S. Kilbourn Ave., Chicago 24.

■

SWIRL-O-MATIC SHUTOFF VALVE is a new water-saver distributed by the Melaire Distributing Co., 420 Lexington Ave., New York 17. Easily screwed on hose between couplings, this all-brass, leak proof valve turns water off and on quickly, the maker claims.

Turn the page

Corrosion won't hurt this TRI-CLAD motor's cast-iron frame

REG. U.S. PAT. OFF.

HERE'S A COMMON SIGHT AROUND MANY PLANTS—A G-E Tri-Clad motor operating reliably and continuously under the extremely corrosive conditions that cause many other motors to fail.

THAT'S WHY YOU CAN EXPECT superior performance from G-E Tri-Clad motors. Consider these facts:

CORROSION-RESISTANT CAST-IRON means longer motor life. Unlike steel, cast-iron resists corrosive pitting, even when the paint is chipped.

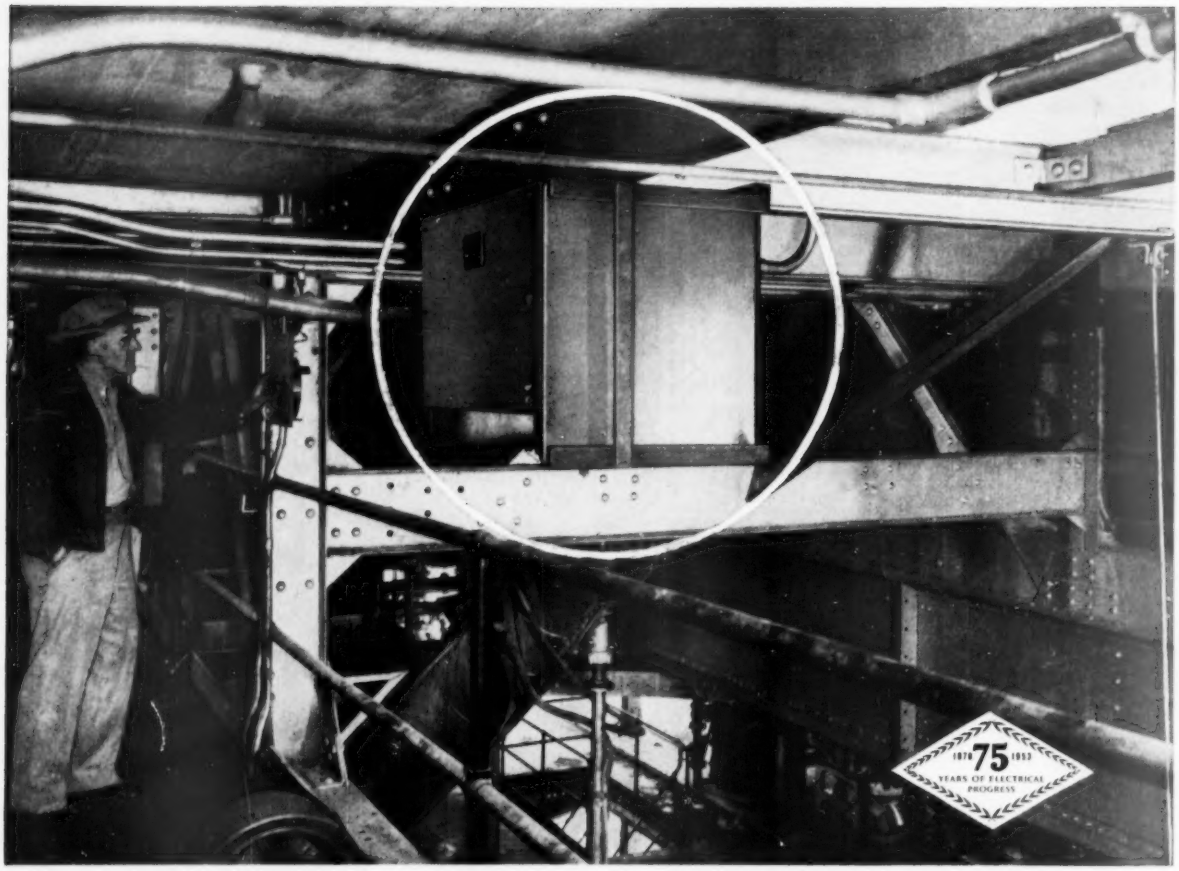
RIGID, CAST STATOR FRAME with integrally cast feet, can't be twisted out of line by accidental jarring or by excessive "bolt-down" pressure on the feet.

STRONG, CAST-IRON END SHIELDS have cast ribs for extra strength without adding extra weight . . . protect the true motor alignment even under heavy shaft loads.

ORDER G-E TRI-CLAD MOTORS from your nearby G-E Apparatus Sales Office or G-E Agent or distributor. General Electric Co., Schenectady 5, N. Y. 752-19

You can put your confidence in

GENERAL ELECTRIC



60-kvar capacitor unit shown above is part of the 600-kvar installation that permitted a 10% increase in load.

Capacitors can be put in out-of-the-way places—such as on these existing horizontal I-beams to conserve space.

Seriously overloaded circuits take on 10% more load after G-E Capacitors are added

American Crystal Sugar Co. profits from an emergency that arose during a recent sugar refining "campaign."

During a sugar beet "campaign" which lasts from July to December, the American Crystal Sugar Company of Clarksburg, California, operates 24 hours a day. Shutdowns mean costly financial losses.

That's why the company really had an emergency on its hands when its electrical facilities became seriously overloaded in a recent campaign. However, the solution was simple. A call to G.E. brought 600 kvar of capacitors to the plant in time to prevent a "burnout."

A short time after the order was placed, the capacitors were installed and in operation. The plant's power factor climbed from 86% to about 97%. This relieved the overloading—*and released enough capacity to handle a subsequent 10% increase in load!*

CAPACITORS HAVE MANY USES

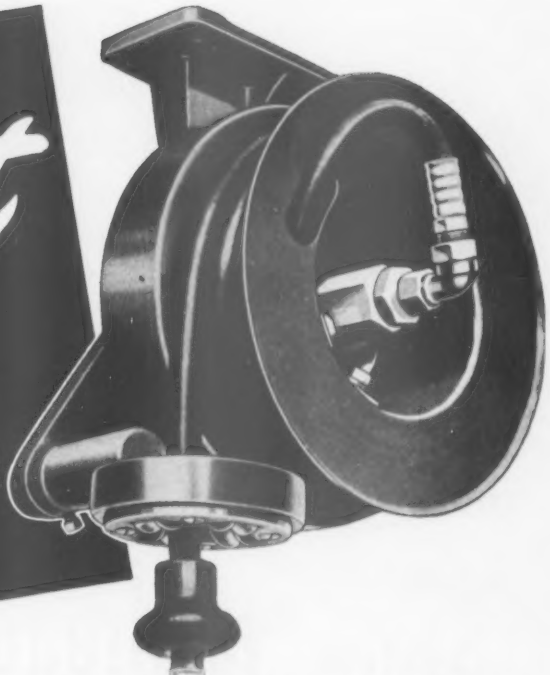
They can often free distribution facilities to carry 20 to 30% more load. Where voltage drop is a problem, capacitors can provide the needed voltage boost inexpensively. And if your power factor is below 85%, and you have a power-factor or kva-demand clause in your contract, they can usually cut your power costs.

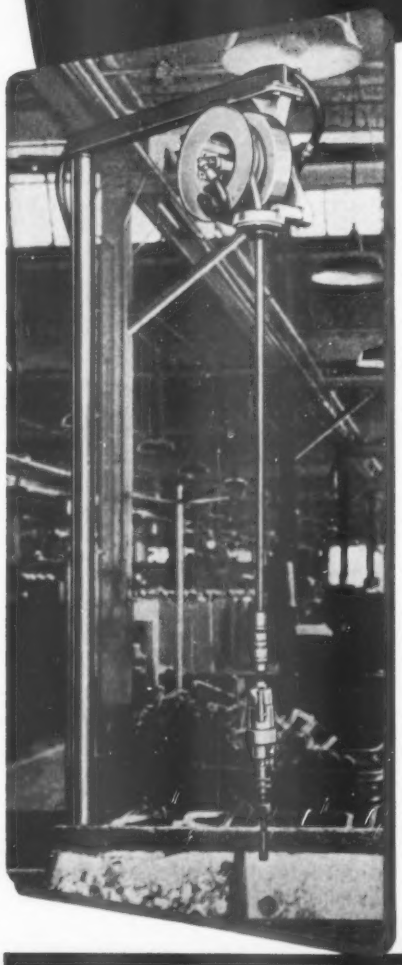
For more information, see your local G-E Apparatus sales office, or authorized G-E agent or distributor. Or write to Section 407-209 for booklet GEA-5632—"How to Reduce Power Costs and Gain System Capacity." *General Electric Company, Schenectady 5, New York.*

GENERAL ELECTRIC

One Unit

COMBINES TOOL SUSPENSION AND AIR SUPPLY





WAYNE "PRODUCTION-BOOSTER" HOSE REEL

Get more production per worker . . . save cost of duplicating equipment and maintenance with Wayne Industrial Hose Reels. One unit combines tool suspension and air supply which simplifies installation . . . keeps tools always within reach . . . saves time on high speed production assemblies.

Spring tension of the reel counterbalances weight of air tool. Allows finger tip control of pneumatic drills, screw drivers, nut runners, grinders, blow guns, spray guns and other air activated tools. Powerful spring motor, with permanent lubrication, provides automatic uptake of tool . . . leaves both hands free to remove work from machine.

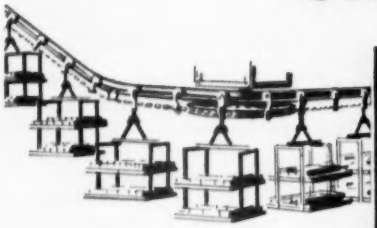
Cut worker fatigue . . . increase production . . . reduce tool maintenance costs . . . prolong tool life by installing Wayne Industrial Hose Reels on your production and assembly lines. There's a Wayne Reel to meet every requirement whether for air, oil or water.

THE WAYNE PUMP COMPANY
SALISBURY, MARYLAND • TORONTO, CANADA

Wayne
NATION WIDE SERVICE

INDUSTRIAL HOSE REELS
FOR AIR, WATER, FLUID LUBRICANTS AND COOLANTS

Your new materials handling system is already started at MHS!



The scientific materials handling system that's right for your plant will differ in many respects from all others. Nevertheless, we have a start toward your system ready and waiting for your call.

All we've learned—in 34 years of producing better materials handling systems, in practical experience in mechanized high production, in our work in automation—lets us see your needs more clearly, meet them more quickly and surely, with greater profit to you.

Get the benefits of MHS experience and practical ingenuity. Call in the MHS engineer.

Mechanical Handling Systems, Inc.

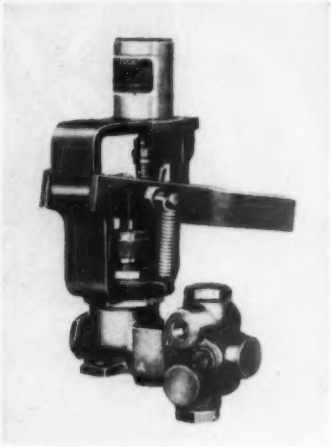
4608 NANCY AVENUE, DETROIT 12, MICH.

Offices in Principal Cities

In Canada: Canadian Mechanical Handling Systems, Ltd.

VALVES & FITTINGS

Begins on page 208



Manually Operated Reset Valve

This valve was especially designed for use in oil refineries gas plants, and other locations, where it is desirable to avoid electrical connections. It operates by loss or application of pressure.

Available in 2-, 3-, and 4-way construction, the valve can be mounted in any position and the operating mechanism rotated 360 degrees.

Automatic Switch Co., Orange, N. J.

■

Coupling for Lines Carrying Fluids

The Slide Seal Coupling permits instant connection and disconnection of fluid carrying lines by a push-pull locking device. When fully disconnected each half of the coupling forms a perfect seal, the producer claims.

The unit can be used to handle water, oils, gasoline, and other similar liquids. Consists of two die cast aluminum assemblies with rubber "O" rings.

Aeroquip Corp., Jackson, Mich.

Turn the page

"R B & W took us off a *hot spot* by cold-forging this key fitting"

● *"You know how important that little fitting is, Joe,"* continued Mr. Tobin. *"It connects the oil line to this filter we* make, and it was this component that gave us one headache after another."*

"How did you clear up the trouble?" Joe asked, as he peered at the oil filter he had seen on so many cars.

"Well, these spuds, as they are called, used to be machined from bar stock. If there were checks or seams in the bar, the machining process failed to detect them. Realizing that spot checking would not eliminate our difficulty, we were forced to magnetically inspect every single spud. This magnetic inspection threw production costs out of line on such a small item. It also showed us that a sizeable part of our production had to be rejected, thus indicating that a change of the production method was necessary.

"Then one of our men thought of RB&W and it wasn't long before their engineers came up with the idea of cold-forging this fitting. Cold-forging made the spud stronger and eliminated the danger of cracking and leaking. It also made the fitting easier to weld to the filter. As a bonus, they even did away with one of the machining operations by forging a countersink at the same time they forged the fitting. Now we're getting better spuds at lower cost in less time — and we no longer need the magnetic inspection."

Maybe this sounds like a special case to you, but it puts in sharp focus RB&W's down-to-earth engineering skill, as well as our practical experience in designing and fabricating the kind of fasteners that can solve your assembly problems.

Most of your fastener requirements can be met with standard products from our stock. However, if the unusual is called for, we'll design and make it for you—as efficiently and quickly as we turned out a better spud for this filter manufacturer.

Remember — for any fastening job, it's a smart move to call in RB&W. You can count on RB&W bolts, nuts, screws, and rivets for uniform accuracy, dependability and physical properties. And you can also count on fast service from RB&W's strategically located plants at: Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill., Los Angeles, Calif. Additional sales offices at: Philadelphia, Pittsburgh, Detroit, Chicago, Dallas, San Francisco. Sales agents at: Portland, Seattle. Distributors from coast to coast.

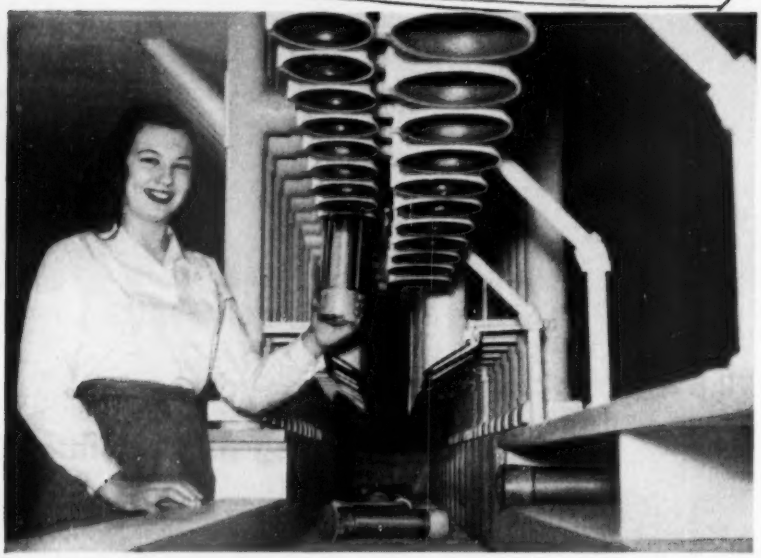
RUSSELL, BURDSALL & WARD
BOLT AND NUT COMPANY

*Fram Corporation, East Providence, R. I.

R B & W 108 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG

Put AIR to Work . . .

CARRYING MESSAGES AND RECORDS — SMALL PARTS — SMALL TOOLS — MATERIALS MERCHANDISE — MONEY



STANDARD PNEUMATIC TUBE SYSTEMS

GIVE YOU AIR EXPRESS INTER-DEPARTMENT SERVICE

FOR safe, swift communication and transport — without delay or dependence on periodic messenger service — between departments — floors — buildings — investigate Standard Pneumatic Tube Systems. They "fly" memos, instructions, letters, records, small parts and tools, merchandise, money, from point to point — nonstop — within your office or plant. Reduce messenger and telephone service. Users report savings as high as $10,000 in 9 months' time.

Standard Pneumatic Tube Systems can be installed for a wide range of needs in industrial plants, warehouses, office buildings, mail-order houses, hotels, hospitals, stores, banks — wherever delivery service between departments and buildings needs to be expedited.

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STANDARD PNEUMATIC TUBE SYSTEMS ARE BUILT BY THE MAKERS OF

Write for Bulletin No. 11 describing representative installations and savings achieved by Standard Pneumatic Tube Systems.

Standard
GRAVITY & POWER
CONVEYORS

VALVES & FITTINGS

Begins on page 208

Small Pipe Filters

These filters are designed for compressed air or gas lines requiring only 40 psi. maximum pressure. One-bolt construction makes inspection and cleaning easy, the maker claims.

Filters can use absorption pad media to remove oil and water vapor from the lines or radial finn inserts to remove dirt and pipe scale.

Dollinger Corp., 11 Centre Park, Rochester 3, N. Y.

■

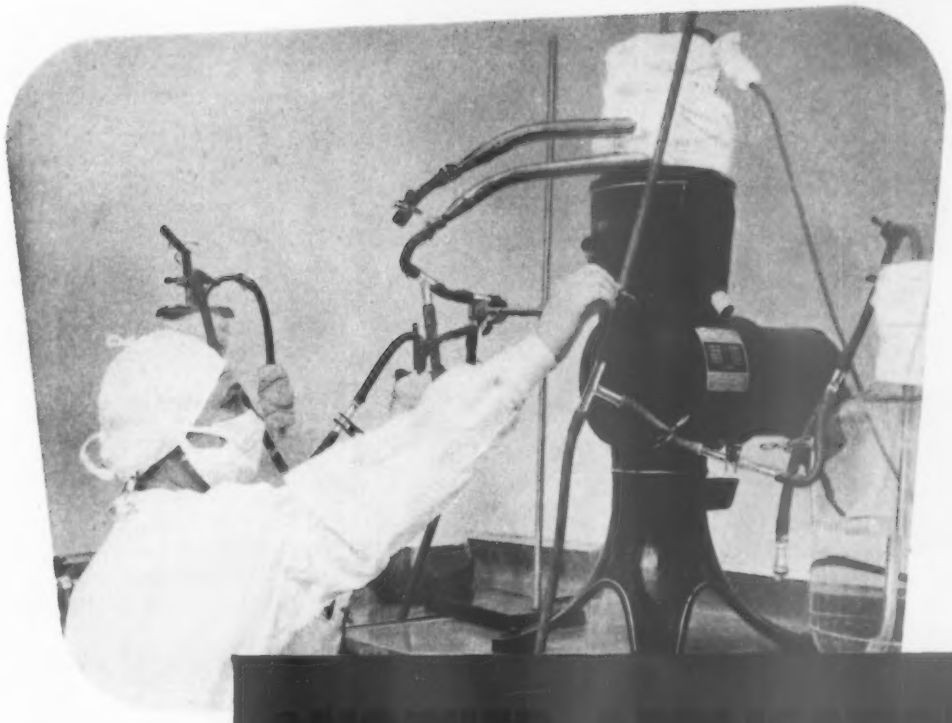
Wrap-Around Pipe Insulation

Aerowrap may be applied to all size pipes in various degrees of thickness without difficulty by repeated wrapping. It is available in rolls of 100 feet, 36 inches wide and ¾ inch thick.

Suitable for pipes with temperatures up to 600 F., Aerowrap can also be applied to fittings, flanges, and valves. After the pipes have been wrapped the insulation is held in place with staples or tape while a jacket is fitted.

Owens - Corning Fiberglas Corp., Nicholas Bldg., Toledo 1.

Turn the page



Processing Human Blood

In processing blood to make plasma, it is important to remove fat cells from the plasma. This is done easily and completely by means of a De Laval centrifuge.

De Laval machines can be used for one-, two-, and three-way separation, usually called clarification because it involves removing a solid from a liquid, such as removing solids from glue liquor.

Two-way separation includes the removal of small quantities of solids (usually less than 0.5%) and storing them in the bowl. The separation of blood is an example. Three-way separation includes the continuous separation of two liquids and simultaneous continuous removal of solids from the liquid mixture. The removal of citrus oil from fruit juice and pulp is an example.

De Laval offers a complete line of centrifugal machines so that you may have exactly the right one to speed up processing in ***your*** plant.

THE DE LAVAL SEPARATOR COMPANY Chicago POUGHKEEPSIE San Francisco

ANOTHER EXAMPLE OF *KELLER Air Tools engineered to industry*

KELLER Airfeedrills outperform advance estimates

These eight Airfeedrills bore 12 holes in 24ST aluminum parts, and make possible a sustained production rate of 600 and more parts per hour—twice the output of the most optimistic advance estimates for the job.

Facts in Brief about Keller Airfeedrills

Accurate holes without costly fixtures

Attaches in any position, at any angle

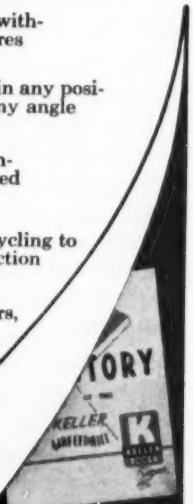
Entirely air-controlled and operated

Pneumatic cycling to speed production

Used in close centers, and in tight places

Easily shifted from job to job

Drills metal, wood, composition, plastics



Send for FREE 24 Page Booklet for more information about automatic drilling with Keller Airfeedrills

Keller Tool Company, Grand Haven, Mich.

Please send me a free copy of your booklet titled, "The HOLE Story of the Keller Airfeedrill."

Name_____

Title_____

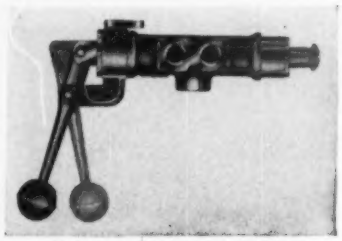
Company_____

Address_____

City_____ Zone____ State____

VALVES & FITTINGS

Begins on page 208



Stroke Control for Air Cylinder

You can now get an air control valve with two speed controls built into the body. The built-in controls simplify the piping used in installations requiring separate speed controls, the producer claims.

Standard 4-way piped exhaust model is now available in the ⅜-in. pipe size.

Valvair Corp., Akron, Ohio.

■

RUBBER - IMPREGNATED LEATHER PACKING has been developed by the E. F. Houghton & Co., Philadelphia. It combines the longer life and lower friction of leather with the non-porosity, resilience, and heat resistance of synthetic rubber. The new packing is called VIM 1243 Type 3 by the manufacturer.

■

A CHECK VALVE with only one moving part is now in production at Anco, Inc., 1 Baker St., Providence, R. I. Instead of an "O" ring for its seal, this valve has two hardened steel pieces which are ground and lapped. The maker claims no pressure is lost through the valve.

■

PILOT-CONTROLLED VALVE designed for handling corrosive liquids, gases, and food products is being made by the Automatic Switch Co., Orange, N. J. Has only two moving parts, the flexible diaphragm and the solenoid core. Bodies are cast iron, bronze, or stainless steel.

Turn the page

BAD AIR IS COSTLY...

... as compared to the blower that keeps air fresh

Your men can't produce at top efficiency when stagnant, hot or fume-filled air robs them of their energy.

Wherever bad air slows down production . . . in shipholds, tanks, drums, boilers or other places where men need fresh, cool air . . . a Coppus Blower becomes both a safety device and a production tool.

Portable and easily adaptable for special purposes, Coppus "Blue Ribbon" Blowers and Exhausters fit all your "fresh air" requirements. The Coppus "Blue Ribbon" means premium performance at ordinary cost. Check and mail the coupon for specific information. Sales offices in THOMAS' REGISTER. Other "Blue Ribbon" Products in CHEMICAL ENGINEERING CATALOG, REFINERY CATALOG, BEST'S SAFETY DIRECTORY, MINING CATALOGS.

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"BLUE RIBBON"
PRODUCTS

HORIZONTAL TURBINE
Six frame sizes —
1 to 150 horsepower

VERTICAL TURBINE
Six frame sizes —
1 to 150 horsepower

FANMIX GAS BURNER

FANMIX GAS-OIL BURNER

MAIL THIS COUPON To Coppus Engineering Corp., 104 Park Avenue, Worcester 2, Mass.

PLEASE SEND ME INFORMATION ON SUPPLYING FRESH AIR TO MEN WORKING:

- ☐ In tanks, tank cars, drums, etc.
- ☐ in underground cable manholes.
- ☐ in aeroplane fusilages, wings, etc.
- ☐ on coke ovens.
- ☐ on steam-heated rubber processes.
- ☐ on boiler repair jobs.

COOLING:

- ☐ motors, generators, switchboards.
- ☐ wires and sheets.
- ☐ general man cooling.
- ☐ around cracking stills.
- ☐ exhausting welding fumes.
- ☐ stirring up stagnant air wherever men are working or material is drying.
- ☐ drying of walls, sheets; etc., after treated with coating material.

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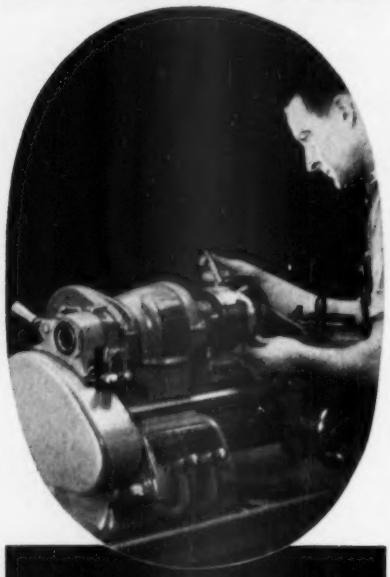
COMPANY.....

ADDRESS.....

CITY.....

(Write here any special ventilating problem you may have.)

SOUTH BEND
10"-1" COLLET LATHE



Precision-Built
FOR
Precision Work

The precision, speed and versatility of this lathe assures efficient output on toolroom or exacting production work. Precision-built throughout, close tolerances can be consistently held with minimum effort and no sacrifice of output. Its large collet capacity, wide ranges of feeds and speeds, and numerous available attachments will enable you to keep it busy on a variety of jobs. *Write for literature...* also 9" to 16-24" Lathes, 7" Shapers and 14" Drill Presses.

SPECIFICATIONS:

Swing—10⅛". Spindle Bore—1⅜".
Center Distances—4, 14¾ to 34¾".
Spindle Speeds—12, 50 to 1357 r.p.m.
Longitudinal Feeds—48, .0015 to .0836". Cross Feeds—48, .0006 to .0309". Thread Cutting—48, 4 to 224 per inch.

SOUTH BEND LATHE
South Bend 22, Indiana
Building Better Tools Since 1906

South Bend Lathes

WHAT'S NEW IN EQUIPMENT

Begins on page 162

MISCELLANEOUS

Waterless Washstations

"Bring the washroom to the worker" is the motto of the manufacturer of the waterless washstation. Requiring a floor space only 18 inches square, this handy unit can be easily relocated to fit changes in plant layout and production lines.

The stand consists of a dispenser of Waterless Skin Cleanser mounted on a turret-top waste receptacle. Space is provided to attach two towel dispensers. There is a compartment in the unit for the storage of additional supplies.

Sugar Beet Products Co., Saginaw, Mich.

■

HIGH - TEMPERATURE INSULATING BLOCKS, known as Supertemp "P. V.", are now being produced by the Eagle-Pitcher Co., 900 American Bldg., Cincinnati 1. These insulating blocks can withstand temperatures up to 1900 F. Because of their light weight they offer faster and easier application, the manufacturer says.

■

FLEXIBLE HEATING TAPE that is flame-resistant and is not affected by exposure to oil, gasoline, grease, or mild acids and alkalis is being manufactured by Air Associates, Inc., Teterboro, N. J. Heat is produced in the tape by passing current through four fine wires that have a protective coating of fibrous glass and plastic.

■

KENFLEX a new greaseproof, alkali- and acidproof, fire-resistant floor covering, is offered by Kentile, Inc., S. Plainfield, N. J. This new vinyl asbestos tile comes in standard 9-in. blocks, is easily installed.

WHERE TO BUY

Featuring additional products, specialties and services for power plants

Pipe Repair CLAMPS

Made for every type of leak—any temperature or pressure. Send for Catalog No. 41-O.

M. B. SKINNER CO., SOUTH BEND 21, INDIANA

STOP *that* WATER

With FORMULA NO. 640, a clear liquid which penetrates 1" plus in concrete, brick, stucco, plaster, etc. Seals out water, dirt. Holds 20' head. Use outside and in. Preserves all absorbent materials. Sold 14 years. Quick, economical, sure. $3 in 55's. Free sample. See Sweet's.
HAYNES PRODUCTS CO., OMAHA 3, NEBR.

STOP DUST

DUSTKOPS — UNIT TYPE, LOW COST
22 Models — 300 cfm to 10,000 cfm, ¼ hp to 15 hp

AVAILABLE FROM STOCK

For: Grinders, buffers, polishers, woodworking, lint . . . ALL DUSTS

Send for Cat. 605; describe problem for recommendation by return mail, without obligation

AGET-DETROIT CO. • ANN ARBOR, MICH.

FLUX
for
SODERING
SILVER SODERING
WELDING
BRAZING

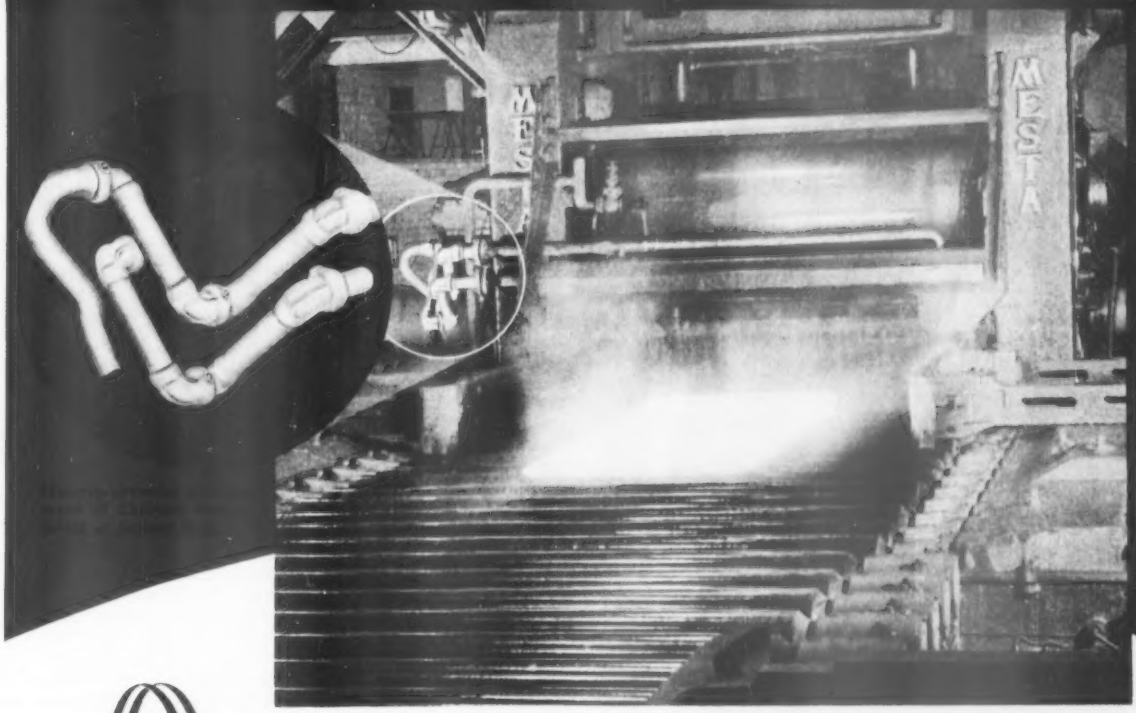
L. B. ALLEN CO., INC.
6781 BRYN MAWR AVE., CHICAGO 31, ILL.

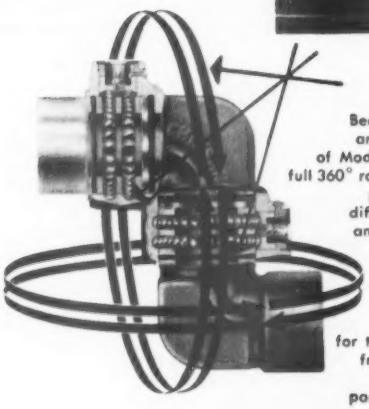
THIS PAGE IS BEING READ!

by most of the 55,690 plant operating men who pay to get FACTORY every month. Your ad in this space will be read by these same important buying influences. Start making sales contact with them at once.

CHIKSAN

SPEEDS the FLOW of STEEL at USS





CHIKSAN Ball Bearing Swivel Joints are THE NEW TOOL of Modern Industry — with full 360° rotation in 1, 2 and 3 planes. Over 1,000 different types, styles and sizes have been developed for pressures and services from 28" vacuum to 15,000 psi and for temperature ranges from minus 75° to a plus 500° F. with packing materials for each specific type of service.

LONG LIFE · LOW MAINTENANCE · SAFETY

Gained with CHIKSAN Ball Bearing Swivel Joints

Chiksan Ball Bearing Swivel Joints give complete flexibility and safety to the coolant lines on the 160" plate mill in U. S. Steel's Homestead Works.

Scale removal from the red hot slabs of steel is an important and exacting operation in the long series which prepares steel for the many thousands of uses which make this metal one of man's most useful servants.

Chiksan high pressure swivel joints enable U. S. Steel to operate its cold water manifolding lines up and down in this scale removing process with complete safety and dependability.

The Flow of Enterprise Relies on

CHIKSAN

Ball-Bearing Swivel Joints

Representatives in Principal Cities
Write for Catalog 53-C, Dept. FMM-4

If any operation or installation of yours, existing or projected, requires more flexibility, greater stamina, longer life and added economy, write CHIKSAN. Our Research and Development Department will help your engineering department find the answer.

PROTECTOSEAL

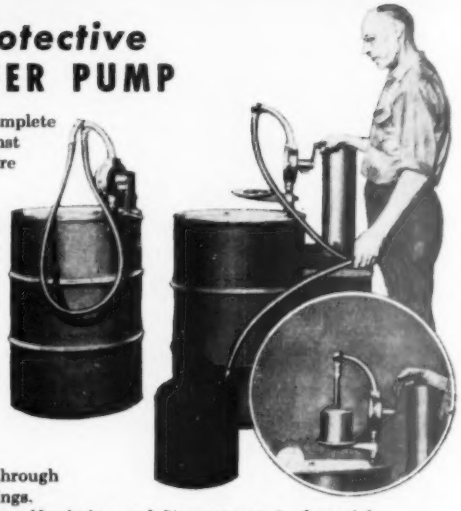
Air-Matic

AN AUTOMATIC PARTS WASHER

is a compact, portable container which provides a new, safe method for the speedy, economical cleaning of small parts, pieces and sub-assemblies. It consists of a leakproof, electrically seam weld safety container with a fusible link in the cover and contains a perforated metal basket for the parts. The cleaning solvent is placed in the container and the basket holding the parts is moved up and down by a reciprocating air engine which operates on any compressed air supply.

Air-Matic is compact, portable and may be set beside production machines where it is convenient to the operator and is always ready for quick, effective washing. It is absolutely safe; the fusible link has a low melting point and automatically closes the cover to smother fire and prevent explosion of the solvent. Parts are moved through the solvent with very little turbulence to hold evaporation vapors to a minimum, and cleaning is completely automatic after a simple setting of the control valve.

Fire Protective
TRANSFER PUMP



Designed for complete protection against explosion and fire hazards, the PROTECTOSEAL Transfer Pump has three flame arresters built into it at the spout, above the bung adapter and at the strainer inlet within the drum. It also provides for vent and pressure relief through protected openings.

The pump is self-priming and is constructed of special aluminum alloy with a brass telescopic tube. It is quickly and easily attached to drums with bung openings as small as ¾" by hand swivel grip connectors and the telescopic tube permits pumping from either the side or end openings of 30 gallon or 55 gallon drums.

VENTS FOR STORAGE TANKS

PROTECTOSEAL builds a wide variety of conservation vents, flame arrester vents, fill and vent units for inside and outside storage, as well as safety tank car loaders and unloaders and similar large volume safety handling equipment. Illustrated is the PROTECTOSEAL inside building vent with removable grid flame arresters approved by Underwriters Laboratories, Inc., for use within buildings. It may be placed in vent lines near or over a process kettle, storage tank, or at any location with easy access for inspection and cleaning. Standard construction is all aluminum with cast aluminum housing and aluminum baffles or grids. Also available with aluminum housing and stainless steel grids or cast iron housing with stainless steel grids. Light in weight; easy to inspect and clean; affords more positive protection in colder months because no freezing of condensate on grid structures.

is Your Complete Source

FOR ALL APPROVED SAFETY EQUIPMENT USED IN THE HANDLING OF FLAMMABLE LIQUIDS IN USE, STORAGE AND TRANSFER

Protects against explosion and fire **Seals** against loss by evaporation
Prevents waste in handling **Speeds** production

For more than a quarter-century, The PROTECTOSEAL Company has devoted its entire engineering and manufacturing resources to the sole problem of the safe handling of flammable liquids in modern production processes. It has looked at the problem as a whole from the point of view of management with the realization that **every** hazardous point in the entire plant process must be protected, and through the years it has developed and produced a line of practical, tested and approved, safety products which enable it to be a complete source of equipment for the safe handling of flammables throughout the entire plant.

To assist you in determining these danger points The PROTECTOSEAL Company has prepared a brief series of simple self-checking charts which will enable you to check your plant and take the necessary steps to guard your production line. These Self-Checking Charts are available without cost as a safety service to industry and will be sent to you promptly by checking the coupon.

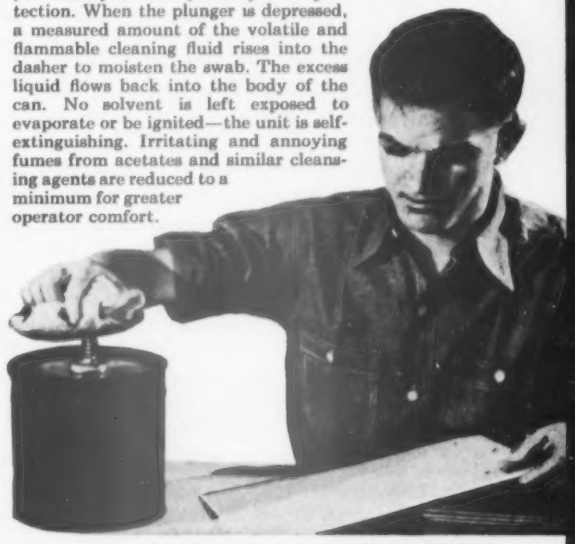
If you prefer, a PROTECTOSEAL safety sales engineer will gladly call to inspect your plant personally and make whatever recommendations are necessary. PROTECTOSEAL sales engineers are specialists with wide experience in the safe handling of flammables in many varying types of industries. They know exactly what and where to check; they know your problems, they know how others have solved them, and they will be happy to call upon you without cost or obligation . . . and if you have a special problem, they and the PROTECTOSEAL engineering organization will assist you in finding a satisfactory answer. The coupon provides a convenient method of requesting this personal service.

BENCH CANS

Reduce waste and speed production in cleaning small parts. A perforated metal fire baffle is the spring mounted dasher. Only a small portion of the flammable liquid is exposed to the air at any time and if this should be ignited, only this small amount burns out, quickly and harmlessly. The main quantity in the body of the can is protected from fire and does not burn. Made in four sizes to meet every small part requirement, it occupies little bench space and the close fitting cover reduces evaporation loss.

PLUNGER CANS

Keep production at regular speed and yet insure plant safety and operator protection. When the plunger is depressed, a measured amount of the volatile and flammable cleaning fluid rises into the dasher to moisten the swab. The excess liquid flows back into the body of the can. No solvent is left exposed to evaporate or be ignited—the unit is self-extinguishing. Irritating and annoying fumes from acetates and similar cleansing agents are reduced to a minimum for greater operator comfort.



CONVERT USED DRUMS INTO FIRE-SAFE CONTAINERS

Used steel drums become automatic-acting fire-prevention equipment when fitted with PROTECTOSEAL Thermo Self-Closing Covers containing a fusible link which melts when the temperature within the drum reaches 160°. This action closes the cover instantly and extinguishes the fire within the drum.

Covers are supplied to fit 30 gallon and 55 gallon steel drums and are exceedingly simple to attach. Fasten a single bolt on the steel strap collar placed around the drum and it becomes a safe, large capacity container for the storage of oily rags, paint, solvents, excelsior, and similar combustibles.

THE PROTECTOSEAL COMPANY
1920 SOUTH WESTERN AVENUE, CHICAGO 8
In Canada: **Safety Supply Co., Toronto**

For Catalogs and Complete Information Clip and Mail Coupon

THE PROTECTOSEAL COMPANY
1920 S. Western Avenue, Chicago 8, Ill.

Please send the information checked below:

- ☐ Safety Can Catalog and Price List.
- ☐ Bulk Storage Safety Equipment Catalog and Price List.
- ☐ Self-Checking Charts.
- ☐ Have sales engineer call.

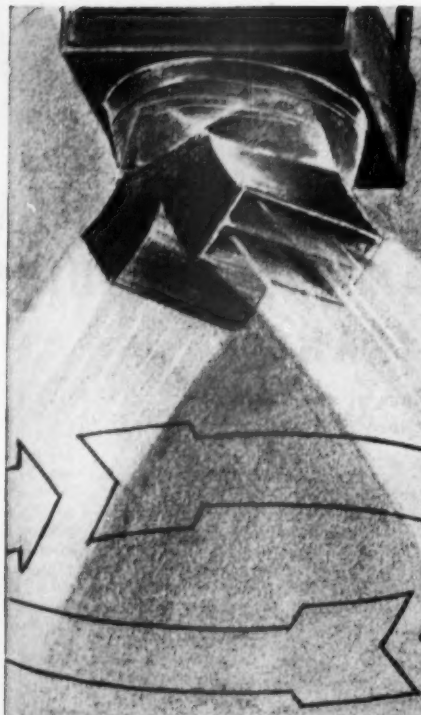
Name _____

Title _____

Company _____

Address _____

City _____ Zone ____ State _____



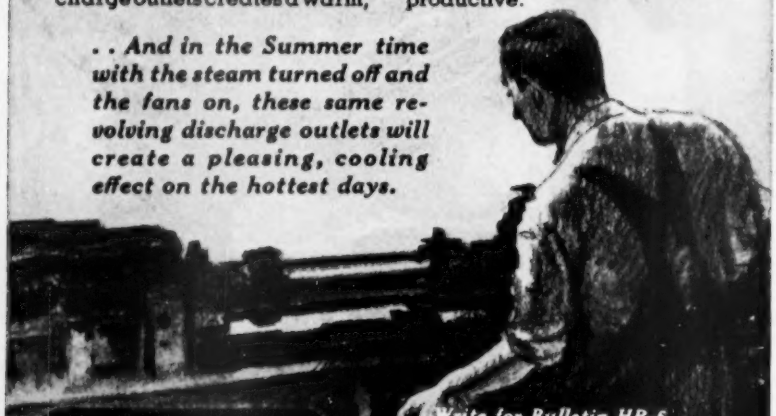
The Moving Airstream Touches the Worker for only a few Seconds at a Time

Perfect Comfort

NO SICKENING HOT BLAST!

THAT is the big difference between most unit heaters and the WING Revolving Heater. The soft airstream from the slowly revolving discharge outlets creates a warm, gentle, yet live sensation of comfortable well-being that is without equal for keeping workers contented and productive.

. . And in the Summer time with the steam turned off and the fans on, these same revolving discharge outlets will create a pleasing, cooling effect on the hottest days.



Write for Bulletin HR-6

Wing

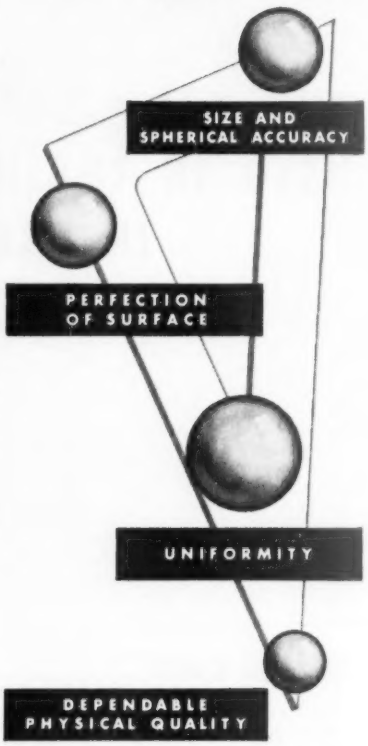
L. J. Wing Mfg. Co.

Linden, New Jersey

Factories: Linden, N. J. & Montreal, Can.

In Europe: Etab. WANSON, Brussels, Belgium

from any angle



STROM *is your* BEST BALL BUY

If you have a metal ball problem, why not let Strom solve it for you. Whether for precision ball bearings or for one of many other ball applications . . . Strom will supply the *right* ball to meet your requirements. For more than a quarter century, industry has looked to Strom for metal balls of unsurpassed quality.

Strom

STEEL BALL CO.

Largest Independent and Exclusive Metal Ball Manufacturer

1850 So. 54th Ave., Cicero 50, Ill.

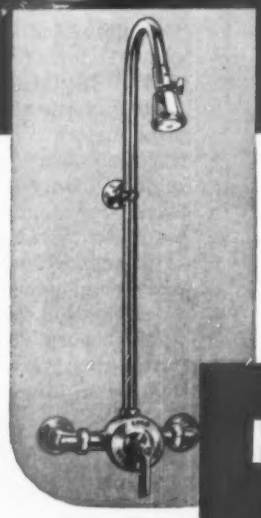
Daybrook drinking fountain

KOHLER PLUMBING FIXTURES

Brockway wash sink

for appearance, convenience, easy maintenance

Greenwich lavatory



Sedley shower

Kohler fixtures and fittings, of time-tested materials, afford the true economy of long satisfactory service.

The space-conserving Brockway wash sink, of enameled iron, is available in various lengths with 2 or 3 mixer type fittings. The Greenwich vitreous china lavatory has a 6-inch back, integral soap dish, Centra fitting with spray face. It is also available with self-closing faucets. Fixture surfaces are acid-resisting, lustrous, easy to clean.

The Daybrook drinking fountain provides a sanitary drinking mound, is adjustable for continuous flow, has a non-squirting bubbler head protected by a metal guard.

The Sedley shower has a ball joint head with volume regulator, Niedecken mixer with single handle for easy temperature control. Kohler fittings are chromium plated, made for heavy duty. Write for catalog.

Kohler Co., Kohler, Wisconsin. Established 1873

KOHLER OF KOHLER

PLUMBING FIXTURES • HEATING EQUIPMENT • ELECTRIC PLANTS
AIR-COOLED ENGINES • PRECISION CONTROLS

SIGNIFICANT DEVELOPMENTS IN PRACTICAL LABOR RELATIONS

TOLD IN BRIEF FOR BUSY FACTORY EXECUTIVES

By PAUL A. KING • Attorney, Bigelow-Sanford Carpet Company, Inc.
Member, New York Bar

VETERANS' LAW DOESN'T GUARANTEE PROMOTION. *Not if promotion is based on presence on the job* . . . . . **Page 222**

WHAT TO DO ABOUT PREGNANT WORKERS. *Shall they be fired? Laid off? Placed on leave of absence? These arbitration awards may help you decide* . . . . . **Page 222**

PENALTIES OF PARTIAL UNIONIZATION. *Raise volunteered to non-union workers gives trouble* . . . . . **Page 224**

PROBLEMS IN CONTROLLING "CONTINUOUS BARGAINING." *You draft a clause that looks air tight and then the NLRB dreams up a wrinkle you never heard of* . . . . . **Page 226**

HOW COMPLICATED SHOULD PROMOTION TESTS BE? *Not complicated at all—at least, for this arbitrator* . . . . . **Page 228**

PROGRESS REPORT ON LIMITS ON FIRING. *An employee said her plant was a hell of a place. She was fired. NLRB said no. Now a court says yes* . . . . . **Page 230**

NLRB ELECTION STRATEGY. *Why not consider a "stipulated election" instead of a consent election?* . . . . . **Page 230**

BRIEF BUT IMPORTANT. *Produce the record first . . . Union wants pay for damaged prestige . . . NLRB reverses a policy . . . Keep those pay records . . . Unfair labor practice* . . . . **Page 232**

Veterans' Law Doesn't Guarantee Promotions

A Federal Court in Pennsylvania disappoints a veteran by reminding him that the Selective Service Law does not guarantee him a promotion—or credits toward a promotion while in service—if the promotion is based on actually being on the job. In this case, the union contract called for promotion after 1160 days of service. Time in the armed forces doesn't count under such conditions, says court. (*Diehl*)

What to Do About Pregnant Workers

Do you fire a pregnant employee? Put her on leave of absence? Let her work on as long as she pleases?

Because of the sentiment involved, to make the right personnel decision is often a hard job. Your decision may be further complicated by the existence of a union contract—and what the arbitrator may think is the right thing to do. For some clues as to what may happen, let's look at some recent awards.

One arbitrator rules that it is against public policy to refuse to grant maternity leave. But each case must be decided on its merits, he said.

Another arbitrator rules that pregnancy should be treated as a "disabling illness" and that leave granted for "involuntary disability" should be given.

Still another completely refuses maternity leave. The contract had no specific clause on the subject. Only mentioned sick leave. Pregnancy, he reasons, is not quite the same as sickness.

In the most recent case, a pregnant employee was discharged when she said she could not continue at work. The company admitted to a policy against maternity leave. Said this policy was needed to cut down turnover. The union contract was silent on the subject. The arbitrator ruled discharge was for "proper cause." (*Texas Co.*)

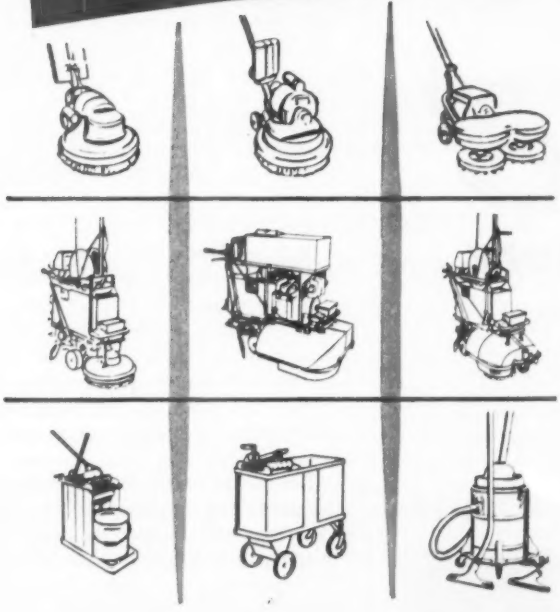
Turn the page

Keep your floor-maintenance men happy . . .

with *Job-Fitted* EQUIPMENT!

Choose from the COMPLETE *Finnell* Line

More than a score of models and sizes permits selection of the equipment that's exactly right for your job!



However much a maintenance man may want to do a good job, and at the same time show savings in labor costs, he's *stymied* if the machine is too small, or too large, or is otherwise unsuited to the job. Different floors and areas call for different care and equipment. That's why *Finnell makes more than a score of floor-maintenance machines.* From this complete line, it is possible to choose equipment that is correct in size as well as model . . . that provides the maximum brush coverage consistent with the area and arrangement of the floors.

Finnell makes *Conventional Polishing-Scrubbing Machines* in both concentrated and divided-weight types, each in a full range of sizes . . . a *Dry-Scrubber*, with self-sharpening brushes, for cleaning grease-caked floors . . . *Combination Scrubber-Vac Machines* for small, vast, and intermediate operations, including gasoline as well as electric models . . . *Mop Trucks* . . . *Vacuum Cleaners* for wet and dry pick-up, including a model with By-Pass Motor. In addition, *Finnell* makes a full line of fast-acting *Cleansers* for machine-scrubbing . . . *Sealers* and *Waxes* of every requisite type . . . *Steel-Wool Pads*, and other accessories — *everything for floor care!*

In keeping with the *Finnell* policy of rendering an individualized service, *Finnell maintains a nation-wide staff of floor specialists and engineers. There's a Finnell man near you* to help solve your particular floor-maintenance problems . . . to train your operators in the proper use of *Finnell Job-Fitted Equipment and Supplies* . . . and to make periodic check-ups. For consultation, demonstration, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2504 East St., Elkhart, Ind. Branch Offices in all principal cities of the United States and Canada.

FINNELL SYSTEM, INC.

Originators of Power Scrubbing and Polishing Machines

50th Anniversary

BRANCHES IN ALL PRINCIPAL CITIES

Millions of users agree—
you cut more pipe with less work
with RIDGID
Heavy-Duty Cutters

There's a big difference in pipe cutters—and you're sure of it the first time you slap a RIDGID on a pipe (any kind) and see how easily cleanly it rolls through the metal. Beautifully balanced for easy action. Factory tested for perfect tracking—and guaranteed warp-proof housings of special malleable hold it. High alloy thin-blade or heavy-duty cutter wheels that leave practically no burr. You cut pipe fast with least effort. Ask your Supply House for the more-for-your-money RIDGID.

THE RIDGE TOOL COMPANY • ELYRIA, OHIO

RIDGID
Work-Saver Pipe Tools

PRACTICAL LABOR RELATIONS

Begins on page 222

From this nicely confused picture, only one thing is clear. You're on your own when it comes to arbitrators' interpretations of union contracts.

Best Bet: take care of the situation by a specific contract clause—if you can get one in to your liking.

Penalty of Partial Unionization

You often have a neat problem on your hands when part of your employees are represented by a union and part are not.

You recognize the need for a wage increase, for example. So you wait for the termination of negotiations with the union group before you give the same raise to the non-union group. As a result, the non-union workers credit the gain to the presence of the union—not to your sound wage policy.

But if you give the raise to the non-union group first, the union group may use it as a bargaining base to start from. So you find that's bad, too.

Maybe you're tempted to give a raise to both groups at the same time—irrespective of negotiations. Sounds good? Watch out! You may get in trouble with the National Labor Relations Board. Here's the story of one company where that's exactly what happened.

Before the union mentioned its demands, the employer decided to give the same hourly increase to union and nonunion workers and to tell everybody about it at the same time. Of 400 workers, only 60 were represented by the union.

Then came bargaining with the union. The employer made his announcement of the increase and

ALEMITE OIL-MIST

saved $2400 first year

...extended bearing life from

20 weeks to one year and four months

Textile mill breaks bottle-neck, cuts Down-Time, ups Production

Bearing temperatures on an important blower were running 200°. Bearings burned out frequently. Production losses totalled $1000 with each failure. Mill output lagged with down-time for repairs. Here was a bottle-neck that had to be broken! Management turned to Alemite lubrication. Installed an OIL-MIST unit costing little more than a hundred dollars. *Result*: Bearings are still operating with no failures to date—after one year and four months. $2400 has been saved, down-time has been eliminated and production increased!

Compare all these OIL-MIST advantages with ordinary methods!

- Reduces bearing temperatures as much as 20%
- Continuous, uniform lubrication of all types of bearings
- Air pressure seals bearings against dirt
- Reduces oil consumption—up to 90%
- Prevents product spoilage
- Eliminates guesswork—each bearing picks up as much OIL-MIST as it needs
- Reduces starting and running torque.

Facts prove this *"Friction Fighter"* most efficient, continuous, fully automatic lubrication system

All industry looks to Alemite for the latest, most advanced lubrication methods. OIL-MIST, Alemite's great lubrication development, is the famed system that *atomizes* oil into mist—distributes it through tubing to bearings—bathes all bearing surfaces with a cool film of clean, fresh oil. Here is the system that simplifies and materially cuts the cost of machinery lubrication. With no moving parts, the lubricator is the last word in efficiency.

Job Proved and thoroughly tested in hundreds of applications in every phase of industry, OIL-MIST uniformly maintains oil film on plain and anti-friction bearings, gears and chains, despite variations in load, temperature or speed. Don't you owe it to *your* business to learn all about Alemite OIL-MIST—*today?*

ALEMITE OIL-MIST Lubricates All Types of Mechanisms

Alemite OIL-MIST Lubrication

A PRODUCT OF SW STEWART-WARNER

Get the facts NOW!

Alemite, Division of Stewart-Warner, Dept. G-43
1850 Diversey Parkway, Chicago 14, Illinois

☐ Please send me a FREE copy of your new and complete OIL-MIST catalog.

☐ Please have your Alemite Lubrication Representative arrange a desk-top demonstration of OIL-MIST. This entails no cost or obligation on my part.

My name .....

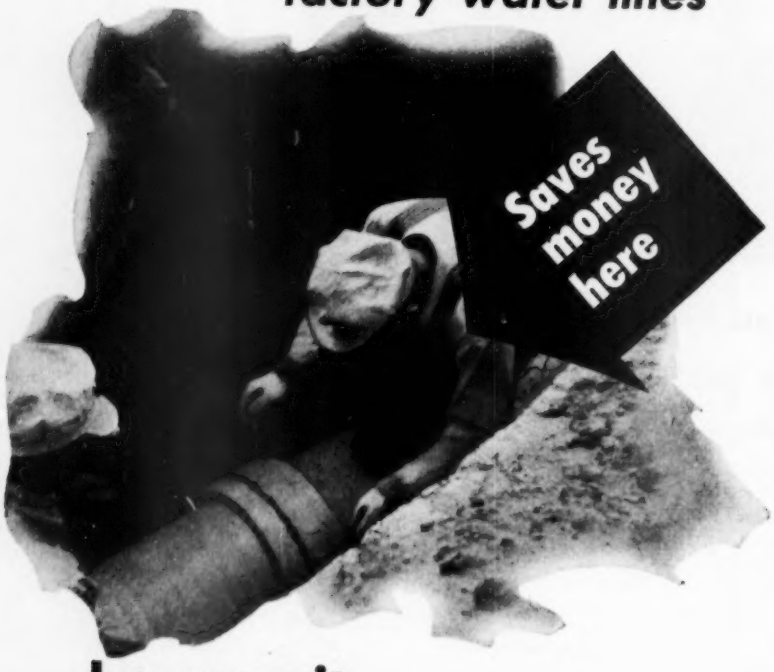
Title .....

Company .....

Street .....

City ..... State .....

Transite Pressure Pipe for your factory water lines



. . . because it reduces **Installation Costs**

Transite* Pressure Pipe for factory water lines offers installation advantages that result in substantial economies.

Since Transite is relatively light in weight, handling operations are easier, faster, and less costly. Except for the larger sizes, mechanical handling equipment is not required. And fast installation of Transite Pipe minimizes disturbance to plant operations.

Simplex Coupling speeds installation—Transite's easily assembled Simplex Coupling speeds installation, provides tight, flexible, lasting joints. It consists of only three parts—a sleeve of Transite and two rubber rings. Final ring positions can be easily checked at the time of installation, using a simple hand gauge.

Transite has high corrosion resistance—Transite's high corrosion resistance assures maintenance-free performance in a wide variety of soils. Its smooth interior assures a high coefficient of flow (C = 140) and, because Transite can never tuberculate, helps keep pumping costs low through the years.

Why not send for the booklet TR-11A which illustrates many of the installation and operating advantages of Johns-Manville Transite Pipe. Just write to Johns-Manville, Box 60, New York 16, New York.

*Transite is a registered Johns-Manville trade mark

JM

Johns-Manville
TRANSITE PRESSURE PIPE
for Water Supply Lines • for Fire Lines • for Process Lines

PRACTICAL LABOR RELATIONS

Begins on page 222

then stood pat with the union, rejecting all compromise offers.

That's an unfair labor practice, said the board. By putting his wage proposal into effect for non-union workers, the employer froze his position—and out the window went good-faith collective bargaining.

Problems in Controlling "Continuous Bargaining"

What do you have to do to put a lid on bargaining? Sometimes the outlook seems pretty hopeless. You draft a clause that looks air tight—and bingo, the National Labor Relations Board knocks it for a loop.

Here's a case in point: From time to time NLRB has reaffirmed the right of a union to require an employer to bargain during the year on matters not incorporated in the union contract. In an effort to eliminate continuous bargaining during the contract year, one company hit upon this clause, which it added to its contract:

"This Labor agreement and the Pension Agreement together contain all the obligations of, and restrictions imposed upon, each of the parties during their respective terms. It is the intent of the parties by these two agreements to have settled all issues between them and all collective bargaining obligations for the term of the Labor Agreement (and for the term of the Pension Agreement relative to pensions) and that no change shall be made . . . prior to expiration."

Looked pretty good for the purpose—to button up the contract for the entire year. But it didn't work. During the year, the union requested certain bargaining data it needed and under labor law would ordinarily be

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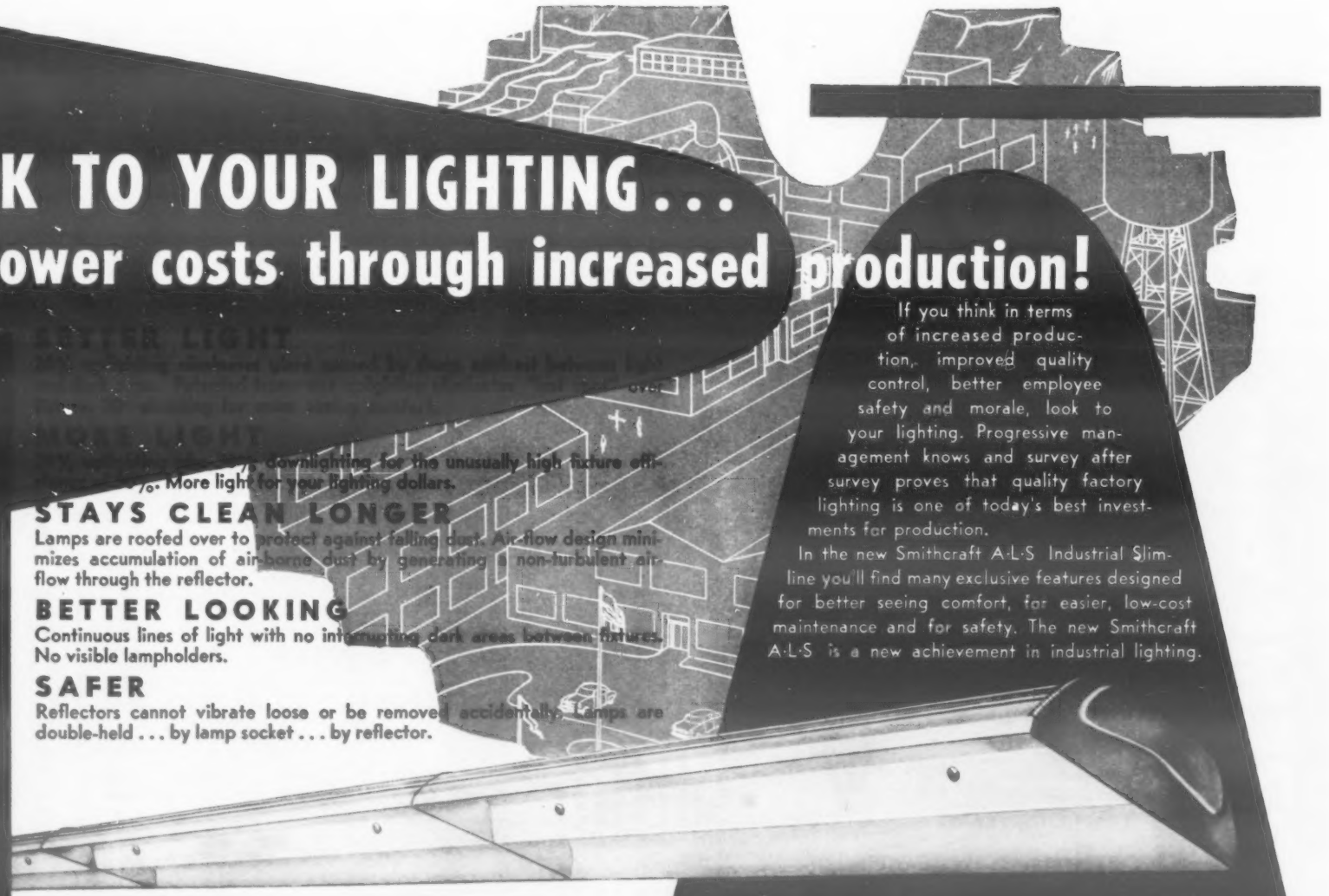
for lower costs through increased production!



If you think in terms of increased production, improved quality control, better employee safety and morale, look to your lighting. Progressive management knows and survey after survey proves that quality factory lighting is one of today's best investments for production.

In the new Smithcraft A·L·S Industrial Slimline you'll find many exclusive features designed for better seeing comfort, for easier, low-cost maintenance and for safety. The new Smithcraft A·L·S is a new achievement in industrial lighting.

...downlighting for the unusually high fixture efficiency. More light for your lighting dollars.

STAYS CLEAN LONGER
Lamps are roofed over to protect against falling dust. Air-flow design minimizes accumulation of air-borne dust by generating non-turbulent air-flow through the reflector.

BETTER LOOKING
Continuous lines of light with no interrupting dark areas between fixtures. No visible lampholders.

SAFER
Reflectors cannot vibrate loose or be removed accidentally. Lamps are double-held . . . by lamp socket . . . by reflector.

Smithcraft LIGHTING DIVISION
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QUALITY and ECONOMY

● SUPREME Brand CHUCKS are "top" quality. They are interchangeable with other makes and have trade acceptance for original equipment and replacement.

CONSTRUCTION: *Entire chuck body* is hardened inside and out. *Taper bore* is hardened and ground. *Jaws* are selected nickel chrome moly alloy steel . . . expertly heat treated for durability. *Sturdy one piece geared nut construction* prevents slippage. *All chucks* are individually tested for accuracy.

THREAD BACK LIGHT DUTY	1A	0–1/4"	3/8"–24		1 9/16"	1 29/32"	1 3/16"	4.95
	5B	5/64–1/2"	1/2"–20		2 7/16"	3 1/16"	1 13/16"	6.95
	5D	5/64–1/2"	3/8"–16		2 7/16"	3 1/16"	1 13/16"	6.95
	6B	0–1/2"	1/2"–20		2 23/32"	3 9/16"	1 15/16"	7.50
	6D	0–1/2"	3/8"–16		2 23/32"	3 9/16"	1 15/16"	7.50
TAPER BACK LIGHT DUTY	1T1	0–1/4"		No. 1	1 9/16"	1 29/32"	1 3/16"	4.95
	5T33	5/64–1/2"		No. 33	2 1/2"	3 1/16"	1 13/16"	6.95
	6T2	0–1/2"		No. 2	2 11/16"	3 1/2"	1 15/16"	7.50
	6T33	0–1/2"		No. 33	2 11/16"	3 1/2"	1 15/16"	7.50
THREAD BACK MEDIUM DUTY	4A	0–1/4"	3/8"–24		1 23/32"	2 5/32"	1 3/16"	5.20
	4B	0–1/4"	1/2"–20		1 3/4"	2 3/16"	1 5/16"	5.20
	4C	0–1/4"	1/2"–24		1 3/4"	2 3/16"	1 5/16"	5.20
	3A	0–3/8"	3/8"–24		2 7/16"	3 1/16"	1 13/16"	6.30
	3B	0–3/8"	1/2"–20		2 7/16"	3 1/16"	1 13/16"	6.30
	3D	0–3/8"	3/8"–16		2 7/16"	3 1/16"	1 13/16"	6.30
TAPER BACK MEDIUM DUTY	4T1	0–1/4"		No. 1	1 23/32"	2 5/32"	1 5/16"	5.20
	4T2	0–1/4"		No. 2 (short)	1 23/32"	2 7/32"	1 3/16"	5.20
	3T2	0–3/8"		No. 2	2 3/8"	3 1/16"	1 13/16"	6.30

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Supreme Products, Inc., 2222 South Calumet Avenue, Chicago, Illinois

THE CHUCK THAT LIVES UP TO ITS NAME . . . SUPREME

PRACTICAL LABOR RELATIONS

Begins on page 222

entitled to receive. The employer turned it down, referring to the clauses set forth above. The NLRB, in turn, reversed the employer, said that the clause was not clear enough or sufficiently unequivocal to consist of a waiver of the union's right to the data (if indeed the union could legally waive such right). (*California Portland Cement*).

How Complicated Should Promotion Tests Be?

It depends to a good extent on how your union contract is worded. But a promotion test need *not* be complicated—or even in writing—to pass muster. At least that's what one arbitrator feels. Here's the story:

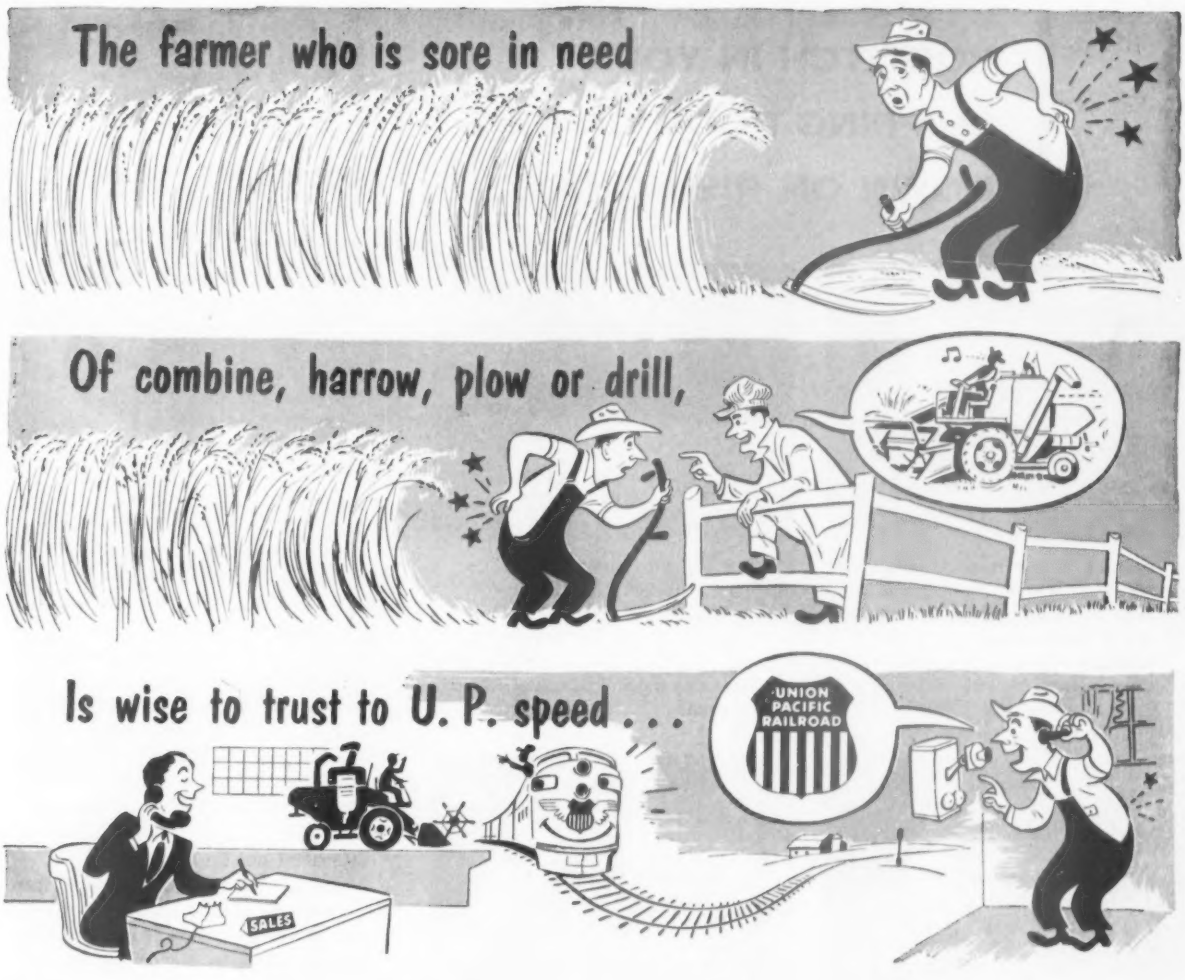
For 9 years, an employee had been a tester for an electronics manufacturer. To become a "special tester"—a better paying job—he was given a simple oral test. The foreman spent one half hour asking him questions about radio and electronics theory.

He flunked the test. Six months later he flunked it again—and an outsider got the job.

The union argued the test was invalid—that there was no standard for passing. The test was not based on a written job description, they also argued. And under the contract the employer was supposed to give preference to the three oldest employees who qualified to do the work.

The arbitrator disagreed. He noted that the contract said nothing about *how* qualified employees were to be selected. In such a case the employer need only be reasonable and fair in his testing. And that he was. All of his "special testers" had taken and passed this same test. (*Hammarlund Mfg. Co. Award*)

Turn the page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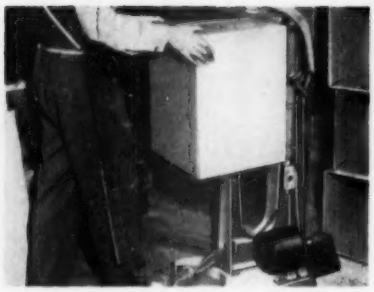

Bostitch Box Bottom Stitchers and Staplers—Many different machines to fit your exact need—whether it's occasional box bottoming or high-speed, continuous production. There's no storage problem—you make up containers as needed.

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BOSTITCH® fastens it better, AND FASTER with wire

PRACTICAL LABOR RELATIONS

Begins on page 222

Progress Report on Limits on Firing

Remember these remarks? "This is a hell of a place to work. They expect one girl to do the work of five, and a girl doesn't even get time to go to the ladies' room."

Recently (FACTORY, February 1953, p. 226) we told about the girl who was fired for saying them—and how the National Labor Relations Board ordered her put back on the job. Since she made the crack while discussing unionism with other girls, the board said her conduct was "concerted activity," protected by law.

Now the courts have had a crack at the case. Result: The girl's remark is *not* protected, says a U. S. Court of Appeals. So she need not be reinstated.

The court's reasoning: First, the employer didn't know that the girl made the remarks when she was engaged in discussing unionism. Not knowing this, how could he fire her because of her "concerted activity"? Secondly, such remarks actually are "griping"—and griping isn't a concerted activity.

NLRB Election Strategy

Tip to companies considering a "consent election": Think about what the National Labor Relations Board terms a "stipulated election" instead.

Here's why: Agree to a consent election and you give up the right to a hearing. You also agree that the NLRB regional director will make the final decision on the conduct of the election—not the NLRB itself. Ask for a stipulated election, and you can have a post-election hearing and a final determination by the NLRB. You only waive your right to a hearing before the election.

Turn the page

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Included also is a list of the 26 illuminating engineering factors which are a part of every RLM standard specification. It is because of these factors that buyers obtain from lighting units bearing the RLM Label the assurance of better performance, long life, sustained lighting efficiency and economical operation.

Copies of the Booklet and 48-page Specifications Book available from any of the 28 manufacturers of RLM Lighting Units or by writing the RLM STANDARDS INSTITUTE, Suite 829, 326 W. Madison Street, Chicago 6, Ill.

RLM ELECTRICAL TESTING LABORATORIES, INC.

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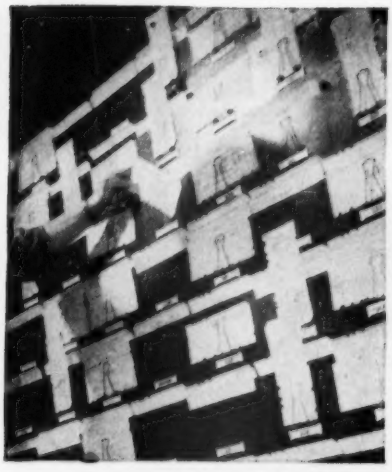

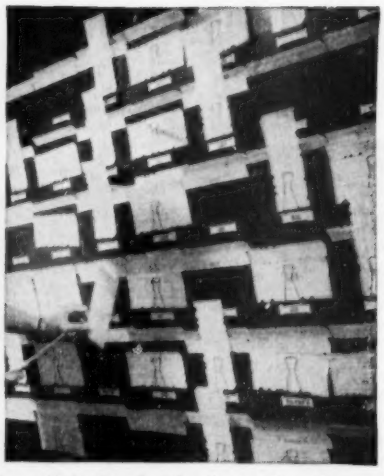

One movement of Job Time Ticket on these McCaskey Boards directs dispatcher, move-man, set-up men and operators according to production plan . . . with

NO ASSEMBLY DELAYS FROM MISSING PARTS NO EXCESS WORK IN PROCESS

Barcalo Manufacturing Company, Buffalo, N.Y. has met the problems of dispatching production of a widely diversified line of products . . . from hand tools and metal furniture to pillows and mattresses . . . with McCaskey Machine Loading, Scheduling and Job Assignment.

Shop orders formerly were handled in a "blind file" and one or more parts often were overlooked or delayed with serious results. This is totally eliminated by the use of McCaskey Machine Control Boards and the following procedure developed by W. J. Navelle, Production Control Manager:

1. Job time tickets are pre-written without operators' clock numbers (see paragraph 7) and assigned to machines by Production Control Department.
2. They are placed by dispatcher in rear pockets of McCaskey Machine Control units in sequence specified by Production Control. Load is recorded on load cards.
3. Foreman selects jobs to be run next and moves tickets to front pockets of control units.
4. Dispatcher issues stores requisition for material, attaches to and notes action on job ticket.
5. Material move-man takes requisition to stores, delivers material to or near machine and marks ticket when move is complete.
6. Set-up man checks board, draws tools and dies and marks ticket when job is ready to run.
7. Job is assigned to operator by dispatcher; his number is written and starting time is stamped on ticket. Ticket then is visibly filed under clip spring at front of control unit.
8. When job is finished, dispatcher rings out ticket, enters production summary on permanent record and sends ticket to Production Control.
9. Production Control completes its record and sends ticket to Payroll Department.

Foreman, by quickly referring to McCaskey Board, selecting jobs to be run and moving job tickets thus provides instructions for (1) dispatcher, (2) move-men, (3) set-up men and (4) operators. Jobs are run and essential operations performed according to Production Control's plan. This McCaskey installation once again demonstrates how readily duplicated effort, delays and confusion are replaced by economical, planned production.

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PRACTICAL LABOR RELATIONS

Begins on page 227

BRIEF BUT IMPORTANT

► **Produce the record first.** It's up to Snuff to bring its records to court. So says the U.S. Supreme Court. It refused to change a circuit court ruling that the American Snuff Company must produce its records at an NLRB unfair-practice-charge hearing before the merits of the complaint are considered.

► **Union wants pay for damaged prestige.** The Chicago Local of the Bakery and Confectionery Workers Union (CIO) sues Leaf Brands, Inc., chewing gum maker for a million dollars. Charges refusal to make a 3¢ wage increase retroactive damaged union standing in eyes of its membership.

► **NLRB reverses a policy.** It used to be that when a union knew about the unfair labor practices of an employer before an election, it had to raise the question right away or be out of luck. Now the NLRB reverses its policy. The election can be held and the union can raise the questions afterwards. (*A&P Tea*)

► **Keep those pay records.** Because wage-salary controls are out, don't throw away your records supporting pay increses. Ma be necessary some day to convince the income tax people of the legality of the increase.

► **Unfair labor practice.** Paying the bill for anti-union letters sent out by your non-union workers is an unfair labor practice. That's the NLRB's conclusion — even if the non-union people ask for it.

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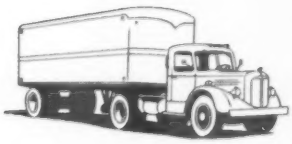
Making light work of heavy-duty fastening ...with 57% savings!



G & O Manufacturing Company, New Haven, Conn., solves major fastening problem with 100% switch to Tinnerman SPEED GRIPS!

Here's how this famous maker of truck and heavy equipment radiators went right to the "core" of soaring production costs. G & O engineers specified SPEED GRIPS to replace the old method of welding nuts to radiator side panels for a big 57% assembly savings! In addition, this led to a big reduction in materials handling ... eliminating costly shipping and servicing of units returned for repair due to weld breaks! Also eliminated was the need for expensive welding equipment, allowing the shift of skilled manpower to other production jobs!

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... replace welded nuts on the G & O radiator side panels as shown above ... snap into bolt-receiving positions by hand...are ideal for use in blind locations, require no welding, clinching or staking; "float" prevents cross threading due to misalignment of holes. Available in a complete range of sizes to meet your needs.

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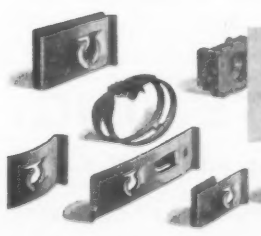

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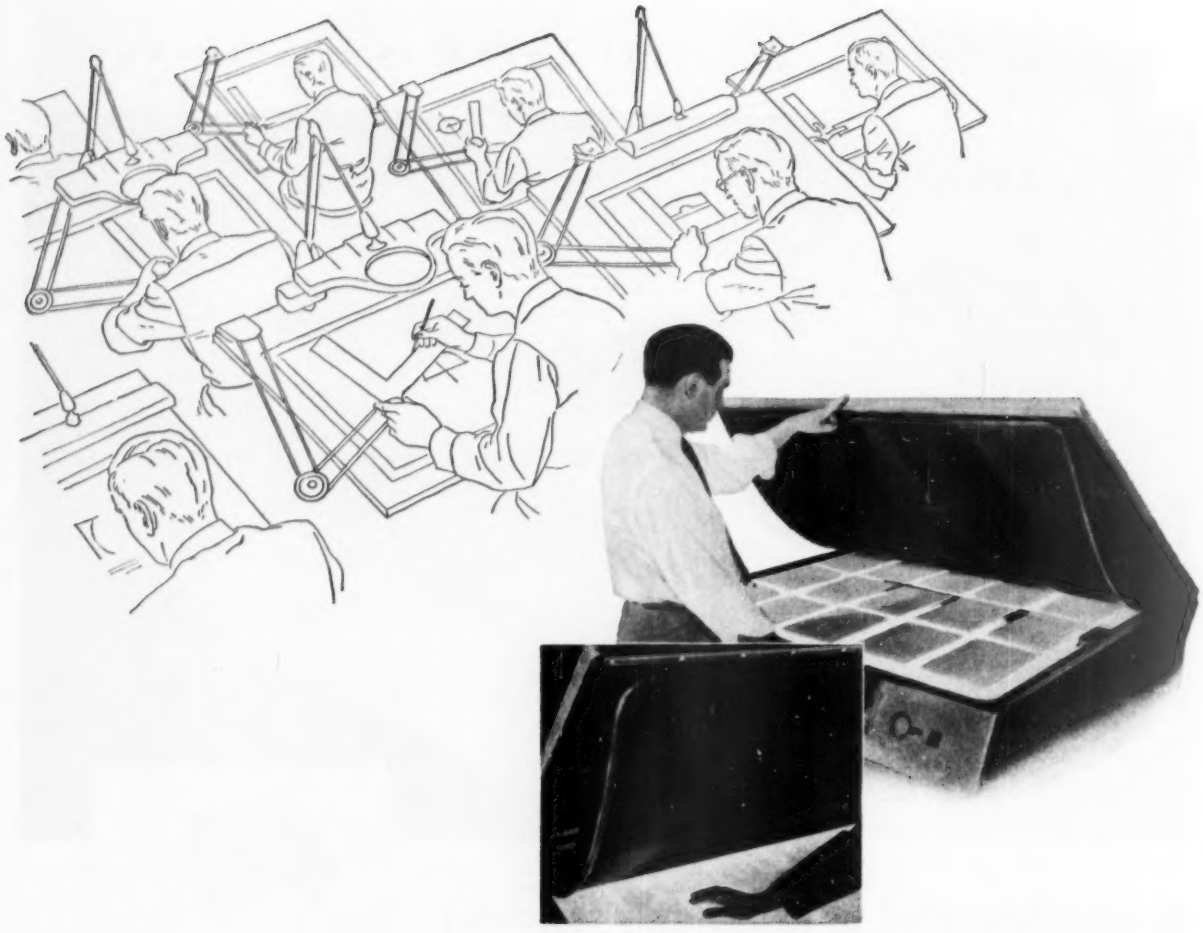

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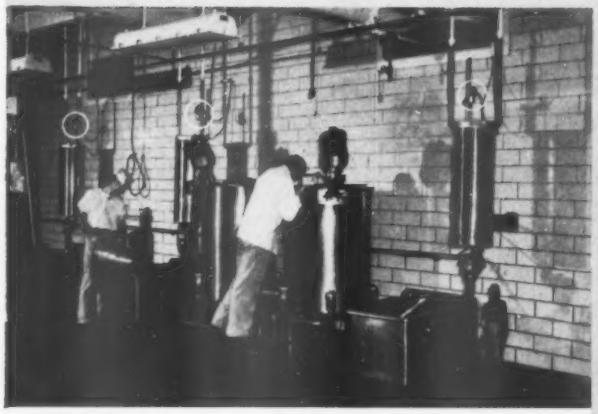
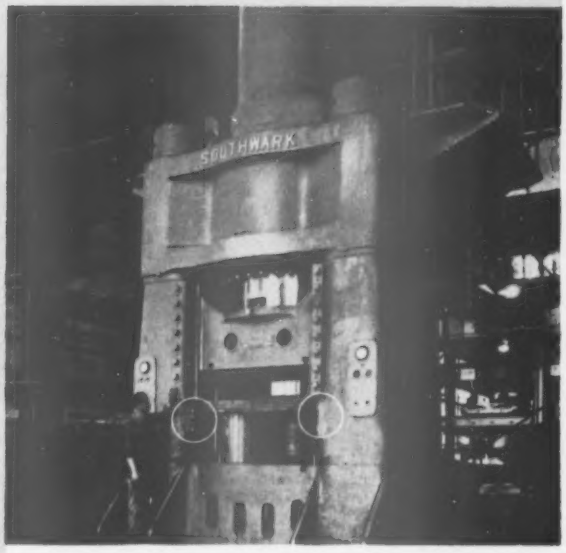
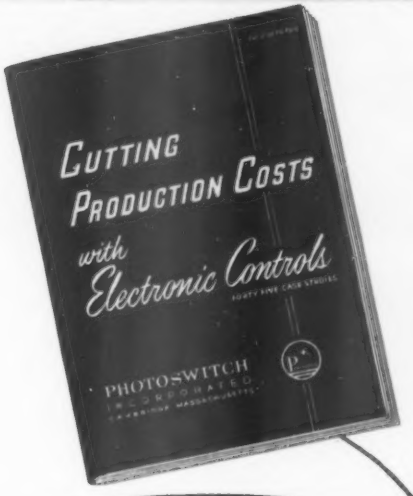
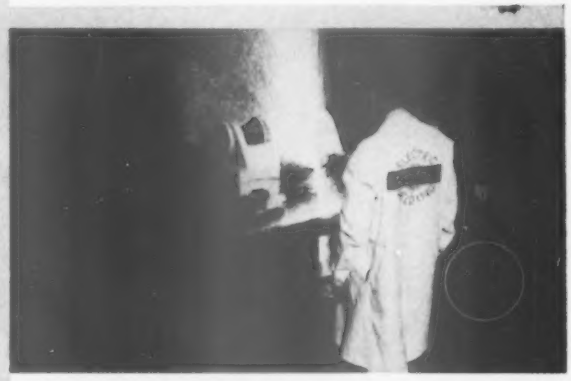


Precision for taste— Three electronic liquid level controls maintain the flow of precise quantities of fruit juices for perfect flavoring of jams.



Protection against a giant— Two photoelectric cells control this giant auto body press. If operator's hand breaks light beam, system stops machine.





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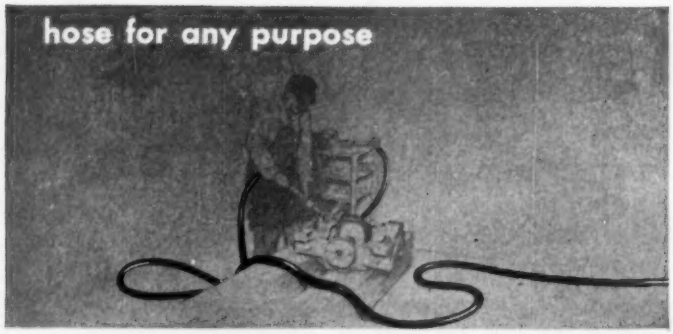

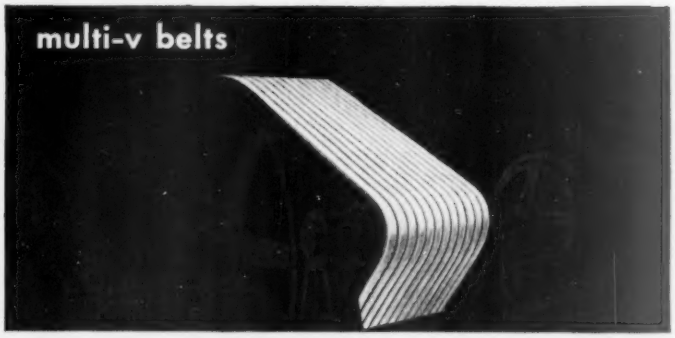

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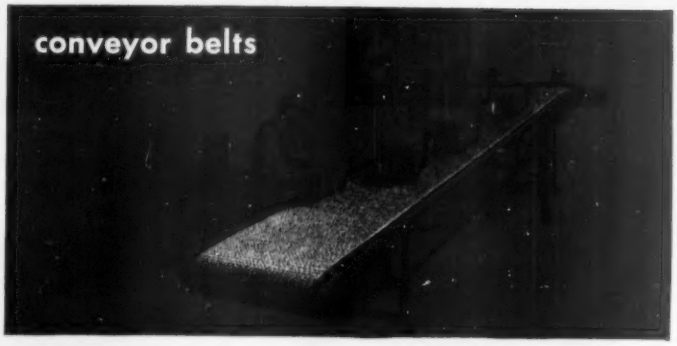

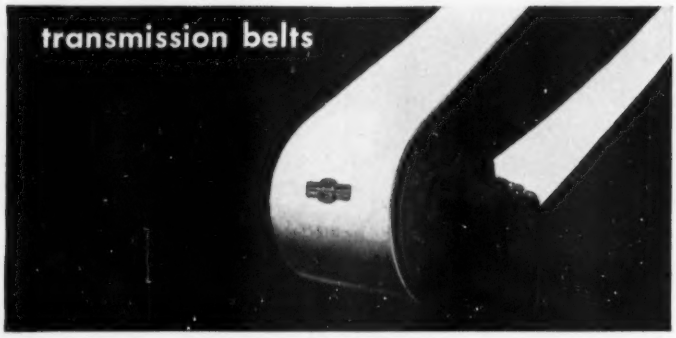

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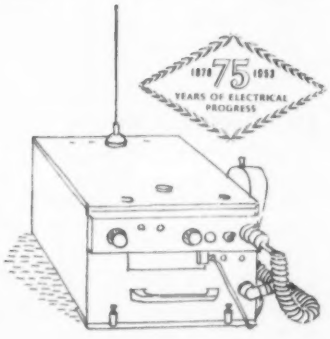
BOTH expensive equipment and personnel stand idle when you use an outdated communication system to find that plant locomotive and get the raw material it carries into production. ***One sure way*** to prevent shut-downs on production lines . . . to get the most out of men and equipment every workday . . . is to equip your plant with *G-E Industrial 2-Way Radio!*

General Electric experience in industrial communications can point the way to lower operating costs . . . higher production rates and profits. Take advantage of the expert advice our CAS* man can offer at your next plant manager's conference. Call the local G-E office today or write: *General Electric Company, Section 6543, Electronics Park, Syracuse, New York.*

*Communications Advisory Service

RADIO can do it better!



You can put your confidence in—

GENERAL ELECTRIC

Ruggedly Safe

—to do any jacking job better!

SIMPLEX JACKS

Re-Mo-Trol HYDRAULIC PULLERS
(PUMPS AND REMOTE CONTROLLED RAMS)
10 to 100 ton capacities

**UNIQUE "CENTER-HOLE"* ** minimizes rigging and set-up—provides more effective power.

Simplifies tough pulling jobs! Pull rod or screw is drawn *through* ram plunger in straight, torque-free pull. Ram is own backup. Also lifts or presses.

*"Center-Hole" in rams of 30 ton and greater capacities.

RATCHET LOWERING JACKS
Lift or lower the load notch by notch. Cannot be tripped. *Toe* has *same capacity* as cap! High lift with minimum clearance means less set-up, less blocking. Single or double acting. 1½ to 20 ton capacities.

HYDRAULIC JACKS
Fast, easy power! Operate vertically or horizontally with same efficiency. Tested to 50% over rated capacity. Single or double pump models; 3 to 100 ton capacities.

SCREW JACKS
Cap floating on single chrome-moly ball reduces friction 88%. Forged cap corrugated for safety. Malleable iron base flared for stability. Four-way or ratchet heads. 10 to 24 ton capacities.

Other SIMPLEX JACKS include:
Simplex-Jenny Hydraulic Pullers
Push and Pull Jacks and Accessories
Reel or Drum Jacks
Trench Braces
Timber Braces
WRITE FOR GENERAL CATALOG No. 50

Simplex
LEVER · SCREW · HYDRAULIC
Jacks
TEMPLETON, KENLY & CO. 1018 South Central Avenue, Chicago 44, Illinois

Use the coupon on page 154 or 244 to get these important . . .

Free NEW CATALOGS

Begins on page 154

PIPELINES AND FITTINGS

8 Valves
Here's a 56-page catalog on a complete line of cast steel valves in capacities from 300 to 1500 pounds. Gives construction features, specs, and application hints for globe, angle, and check valves. Edward Valves, Inc.

9 Flexible Valves
Pinch - type, non - plugging, flexible valves made of pure rubber or many special compounds get the spotlight in this 24-pager. You learn how they work, where to use them, and how to select. Catalog No. FL382. Farris Flexible Valve Corp.

10 Valves
Bulletin No. 1000 describes and illustrates a line of valves for operating air and hydraulic cylinders and motors—single or double acting. Includes operating and circuit diagrams, dimensions, and weights. 16 pages. Ledeen Mfg. Co.

11 Purifiers
You learn how to solve dirt and moisture problems in pipelines carrying live steam, exhaust steam, compressed air, vapors, and gases. Catalog No. 700 suggests a variety of applications, describes installation, illustrates 7 types of equipment. 8 pages. V. D. Anderson Co.

12 Packaged Heater
A 4-page folder gives you the story on a compact "package type" de-aerating heater for smaller steam-generating plants. Lists features, describes operation. Specs and dimensions. Bulletin No. WC-110. Graver Water Conditioning Co.

Turn the page

HALL INDUSTRIAL WATER REPORT

Hall Laboratories, Inc.—A Subsidiary of Hagan Corporation, Pittsburgh, Pa.

Volume 1 | APRIL 1953 | Number 2

Water as a Raw Material

The sea is a vast storage bin of elements necessary for 20th century industry. Extraction of elements requires the handling of tremendous quantities of water; 300,000 gallons of water to get a ton of magnesium, 5 million gallons for a ton of bromine.

Water is necessary to all industry, where it is used as a solvent, a carrier, a diluting element, dispersing and cooling agent, for cleansing. Water is your industry's most important raw material—don't waste it!

From British West Indies To Japan, Hall System* Goes International

Alex Henricks, engineer on the Hall headquarters staff, by-passed three weeks of U.S. winter weather in the British West Indies, where he initiated Hall System* in a sugar factory boiler house. This plant had asked advice of a local company (a Hall client) after suffering tube losses due to corrosion.

And Hall "know-how" in industrial water conditioning is now being exported to the Orient. Japan Organo, Ltd., representing Hall Laboratories, is introducing Hall System* and applying Threshold Treatment with Calgon* to cooling water as well as to various process industries. To accomplish this, Mr. Tadashi Nagao, chemist for 20 years with a Manchurian utility, recently spent 6 weeks at Hall headquarters.

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information, write, wire, or call Hall Laboratories, Inc., P. O. Box 1346, Pittsburgh 30, Pennsylvania.

SLUDGE-STALLED BOILERS BACK ON THE LINE

Sometimes it's just plain sludge, but the unusual keeps Hall engineers hunting for process leaks

In one specific case, use of only 30 per cent of unsoftened make-up caused sticky sludge accumulation in tubes, and so deep in the drum that the feed pipe was almost covered. A quick analysis of this sludge by Hall Laboratories identified it as calcium phosphate, magnesium silicate, and magnesium phosphate.

Burosil* fed to the boiler precipitated the magnesium as magnesium silicate. Now boilers are virtually sludge-free, and operate through the entire heating season, instead of having to be cleaned at 2-month intervals, as formerly.

That was a normal problem. But the boiler water of a ceramic plant contained a lot more suspended matter than should have been there. A check on the feedwater by the Hall engineer showed why—it was carrying clay "slip."

When a break in the condensate line was located and repaired, no more "slip" was pulled into the system by the vacuum return system, and boiler operation returned to normal.

Once in a while, the Hall men run onto a corker. Like the boiler sludge that developed in a plant which makes certain catalysts. A sudden drop in boiler water alkalinity heralded the trouble. Make-up water composition had not changed, but inspection revealed an exceptionally heavy sludge. Analysis of the boiler water showed 5 times the normal dissolved silica concentration. Suspended solids showed high silica and alumina. Guided by these clues, the operators and Hall men traced the trouble to one of the process heat exchangers. Several leaky tubes were found which contaminated the condensate returns with catalyst.

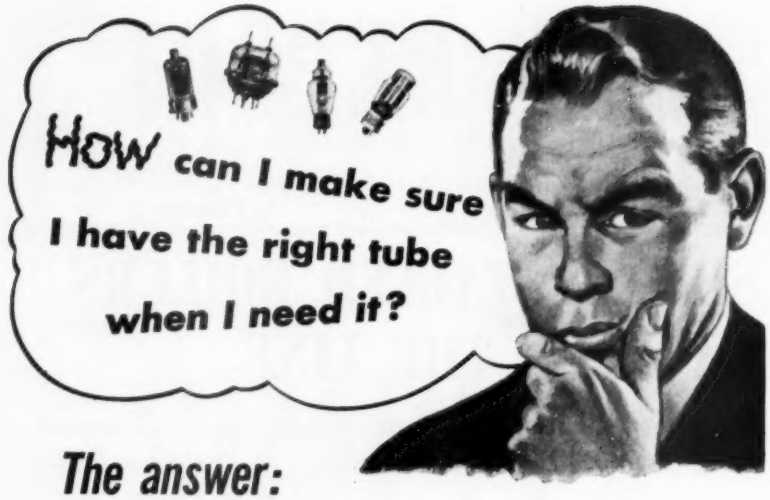
It sounds easier, in capsule form, than it really was; however, the sludge problems were handled quickly, because in each case, facts developed at Hall Laboratories pointed a way to the solution.

Equipment for Water Analysis Shown to Pittsburgh Conference

In early March, Hagan Corporation exhibited apparatus, developed by Hall Laboratories for use in water analysis, to the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy. Electrical conductivity equipment, cooling coils, and the Hagan Automatic Degasser for securing gas-free samples of condensed steam were shown.

Hall Certified Reagents were featured together with associated equipment for running Schwarzenbach hardness titrations, a new rapid anion exchange method for solids in boiler water, and other selected colorimetric and titration procedures.

*"Calgon" and "Burosil" are registered trademarks. "Hall System" is registered as a service mark by Hall Laboratories.



The answer:

RCA's new Tube Requirement Analysis!

Now you can stop worrying about the possibility of a costly production shut down—in the event you have neglected to reorder a key tube type. Now you can also save money by avoiding "overstocks." RCA's new Tube Requirement Analysis gives you smooth control over your industrial tube requirements.

Get in touch with your RCA Tube Distributor

Give him all the information you can about your electronic equipment, the tube types involved, and your special requirements. In this way, you bring him up to date on the services in which your tubes are operated.

He analyzes your needs

—Then your RCA Tube Distributor can prepare a record of movement on each tube type required for your equipment—can study *your* specific tube requirements.

He recommends a plan for YOU

Now, your RCA Tube Distributor presents a tube inventory plan—simplified and "tailored" specifically to your operations. He keeps up to date on your inventory . . . and backs it up with inventory service on his end, too! No overstocking. No shortages. Yet you can be sure you have the right tube—when you need it!

RCA's new Tube Requirement Analysis is available exclusively through your local RCA Tube Distributor. Call or write him, today. There is no charge or obligation for this service.

RCA ® ELECTRON TUBES

RADIO CORPORATION of AMERICA

HARRISON, N. J.

Use the coupon on page 154 or 244 to get these important . . .

Free NEW CATALOGS

Begins on page 154

MECHANICAL EQUIPMENT

13 V-Belts

Multiple V- and fractional-horsepower belts are subjects of this 8-page catalog. Product illustrations, complete specifications, dimensions, and prices for each type belt. Form No. 3787. Thermoid Co.

14 Gear Couplings

This catalog tells you how and where you can use maker's flexible gear couplings. Features, typical applications; installation and selection data tell you all you need to know. 16 pages. Catalog No. C4. Sier-Bath Gear & Pump Co., Inc.

15 Stock Gears, Speed Reducers

Here's a 176-page, pocket-size catalog that brings before you a full line of stock gears, sprockets, speed reducers, and related industrial equipment. Engineering data section helps you select and serves as useful reference. Catalog No. 67. Charles Bond Co.

16 Rotary Pumps

There's information on herringbone gear and sliding-vane-type rotary pumps in this catalog (No. W-483-B2). Describes fields of application, mountings, and dimensions. Engineering data included. 16 pages. Worthington Corp.

17 Roller Chains

This 76-page catalog gives you information on many types of standard roller, double-pitch roller, noncorrosive, and cable chains. Also sections on sprockets, flexible couplings. Complete specs and engineering data. Acme Chain Corp.

Turn the page

The story of "Gravel Gertie" and her belts!

HERE YOU SEE "Gravel Gertie", a dry-docked gold dredge converted into the world's only floating preparation-stacker plant. It processes gravel fed by a 3-yard dragline and stacks 3 sizes of aggregates directly into 3 stockpiles. In addition, "Gravel Gertie" still produces her old product—gold.

This remarkable plant eliminates high haulage costs by bringing the machine to the gravel, rather than the gravel to the machine. Her equipment includes belts by New York Belting & Packing, installed on the crushing machinery as well as the oversize conveyor.

The local NYB&P Distributor worked closely with the engineers in selecting and designing these belts. The "Gravel Gertie" installation typifies the kind of specialized service provided by NYB&P Distributors everywhere. See the one nearest you for all—

NYB&P INDUSTRIAL RUBBER PRODUCTS and
Gilmer V-BELTS and "TIMING" BELTS

NYB&P — NEW YORK BELTING & PACKING CO. 1 Market St., Passaic, N. J.

America's Oldest Manufacturer of Industrial Rubber Products

ALL HANDS ARE "SKILLED HANDS"

WITH

ANSUL DRY CHEMICAL
FIRE EXTINGUISHING
EQUIPMENT

With Ansul Extinguishers near-expert results are obtained by inexperienced operators. In fact, all Ansul Extinguishers are designed to provide a maximum of extinguishing effectiveness in the hands of inexperienced personnel.

This feature, plus benefits listed below, account for the outstanding preference for Ansul Equipment by fire protection men in all phases of American industry.

Send for File No. 802. You will receive a variety of helpful printed matter. Included is our latest catalog which describes Ansul Extinguishers of all sizes — from the small Ansul Model 4 to Ansul Piped Systems and Ansul 2000 lb. Stationary Units.

1. Water-tight construction throughout.
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3. Quick, positive puncture operation.
4. Special cartridge guard protects cartridge . . . rugged construction throughout.
5. Ansul *"PLUS-FIFTY"* Dry Chemical used exclusively.
6. Corrosion resistant construction throughout.
7. Greater fire-stopping power.
8. Field tested by thousands of satisfied customers.

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Use the coupon on page 154 or 244 to get these important . . .

Free NEW CATALOGS

Begins on page 154

18 Power Transmission

In Catalog No. R-103-A is shown a full line of V-belts, pulleys, sheaves, roller chain, belt lacing, speed reducers, and other equipment. Illustrations, spec tables, and price lists. 32 pages. Rockwood Pulley Mfg. Co., Inc.

AIR HANDLING

19 Coil Heaters

Here's a 12-page bulletin on electric blast coil heaters that describes applications and advantages. Selection and installation data, spec tables. Industrial Engineering & Equipment Co.

20 Proportional Mixers

This 18-pager describes a proportional mixer for use with gas-fired industrial furnaces, ovens, kilns, driers, and other plant equipment. Application and operating data, selection tables. Typical piping layouts and dimensions included. Catalog No. 805A. Hauck Mfg. Co.

21 Vacuum Cleaning System

Information on how you can use maker's central vacuum cleaning system utilizing stationary piping and flexible hose in this catalog (No. D-5). Gives features, how-it-works data, describes construction details and piping layout. Section on accessories. 20 pages. Lamson Corp.

22 Fans

Catalog No. 515 describes a line of V-belt-driven, packaged fan equipment. Lists features, gives complete capacity information in easy-to-read chart form. Dimension data and photographs of each product and product component in the line. 28 pages. Clarage Fan Co.

Turn the page

The U. S. Steel Supply team that gives you

personalized service

He specializes in solving your technical troubles!

OUR product specialist is qualified to give you expert advice on the selection of steel for a particular purpose, and on the choice of tools, equipment and machinery that can frequently speed up your production. He can interpret and develop specifications to fit your needs, and he can advise on the methods of handling the various kinds of steel and steel products during your production operations. Often he can save you time or money, or help you meet a delivery date by suggesting alternate materials for your product. And at his finger tips is the latest information about government restrictions, expected availabilities of special grades of steel, and similar subjects.

You can put a product specialist's talent to work on your problem through your U. S. Steel Supply salesman. Your salesman is the "quarterback" of the U. S. Steel Supply team of experts. When he knows your needs, he will put the right man or combination of men to work to satisfy them quickly.

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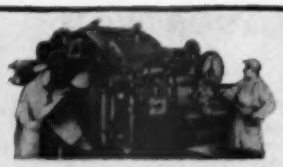

"THIS LUBRICANT INCREASED BEARING LIFE FROM 2 WEEKS TO 2 YEARS"

—says THE GLOBE COMPANY

"Animal acids and moisture, most harmful to ball and roller bearings prevails in the entire meat packing industry. With conventional lubricants, some of the bearings in our Roto-Cut machines did not last two weeks. Since using Ball Bearing LUBRIPLATE in machines operating continuously 24 hours a day for over two years, we have not had a single bearing replacement."

For nearest LUBRIPLATE distributor, see Classified Telephone Directory. Send for free 56-page "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

Use the coupon below — or the duplicate on page 154 to get these

IMPORTANT NEW Free CATALOGS

Begins on page 154

MISCELLANEOUS

23 Dial Indicators
This 24-page catalog describes 6-in. dial indicators for temperature, pressure, and load applications. Selection and reference material included. Tells how to use, gives mounting dimensions for the different types of instruments. Bulletin No. 98214. Taylor Instrument Companies.

24 Roofing Surface
In this folder you're shown the features of a new heavy-duty roofing surface for old or worn built-up asphalt roofs. Tells how the material is made of fibrous glass roofing mat impregnated with liquid asphalt. Describes how it works, lists steps in installing. Owens-Corning Fiberglas Corp.

25 Pipe Machines
8-page catalog on pipe-threading machines describes two models. A single adjustable die-head handles all sizes of threads in the range of each machine. Specs, photos. List No. 9-D. The Oster Mfg. Co.

26 Work Gloves
Many types of industrial work gloves for specific plant jobs are shown in this 12-pager. Illustrations, specs, features and applications for each type of glove. C. Walker Jones Co.

27 Steel Strapping System
Here's a 12-page folder to illustrate and describe maker's strapping, band tools, and fasteners. Tells when to use each type and lists features. Catalog No. SS-9C. The Stanley Works.

28 Shears
Bulletin No. 234 on double-angle shears contains specs on several models. Construction features, applications, illustrations, and specifications. 4 pages. Kling Bros. Engineering Works.

For catalogs 29 through 45 see Plant Engineering Problems, page 246, and Plant Operating Problems, page 250.

DUPLICATE COUPON ON PAGE 154

MAIL THIS COUPON FOR FREE CATALOGS *(Good until June 30, 1953)*

FACTORY MANAGEMENT & MAINTENANCE (April 1953)
330 W. 42nd St., New York 36

I'm circling the numbers of the catalogs and bulletins I want:

1	2	3	4	5	6	7	8	9	10	11	12	13
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DUTCH BRAND offers

SPONGE RUBBER (Meeting ASTM specifications)

Choice of densities . . . Choice of colors

Use DUTCH BRAND Sponge Rubber for cushioning and vibration control, to seal out dust, to dampen noise and absorb shock.

DUTCH BRAND Sponge Rubber is fresh and alive and excellent for a wide variety of manufacturing uses. It comes in a selection of densities, colors and thicknesses. Manufacturers use it for packing . . . to cushion vibration . . . to absorb shock . . . to dampen sound . . . as weatherstrip to seal out dirt and dust . . . as a gasket . . . as a mount for products . . . to prevent metal to metal contact . . . and for varying other uses.

DUTCH BRAND Sponge Rubber is now being made available to local industrial distributors on a stocking basis . . . this offers prompt service.

DENSITIES

NATURAL RUBBER	ASTM SPECIFICATIONS No. D1056-51T
No. 3832 Soft Density	RN11
No. 4022 Medium Density	RN12
No. 4030 Firm Density	RN13
No. 4031 Hard Density	RN14
NEOPRENE	
No. 3399 Soft Density	SC11
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COLORS

1. Brown
2. Gray
3. Red
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5. Other colors available where quantities warrant

THICKNESSES

⅛ inch to 1 inch inclusive

SIZES

Rolls, sheets, strips with or without adhesive . . . die cut forms . . . custom molded pieces.

Also DUTCH BRAND TAPES for INDUSTRIAL USES

ELECTRICAL TAPES

- Plastic .007"
- Plastic .010"
  - Master Shop Package
  - Jr. Shop Package
- Friction Tape
  - Jumbo Shop Package
  - Special Width
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- Rubber Insulating Tape
  - Hippo Shop Package
  - ASTM Rubber Tape
- Electro Coil Tape
- Glass-Fibre Tape
- "DB" Wire Connectors

TAPES: Pressure Sensitive

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- No. 301 Masking (Flat Back)
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- No. 307 Drafting
- No. 353 OD Cloth Tape
- No. 350 Techni Tape
- No. 351 Double Tak
- No. 358 Twin Tak Tape
- Anti Squeak Tape
- Structural Glass Joint Tape
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PLEASE SEND SAMPLE OF FOLLOWING PRODUCTS

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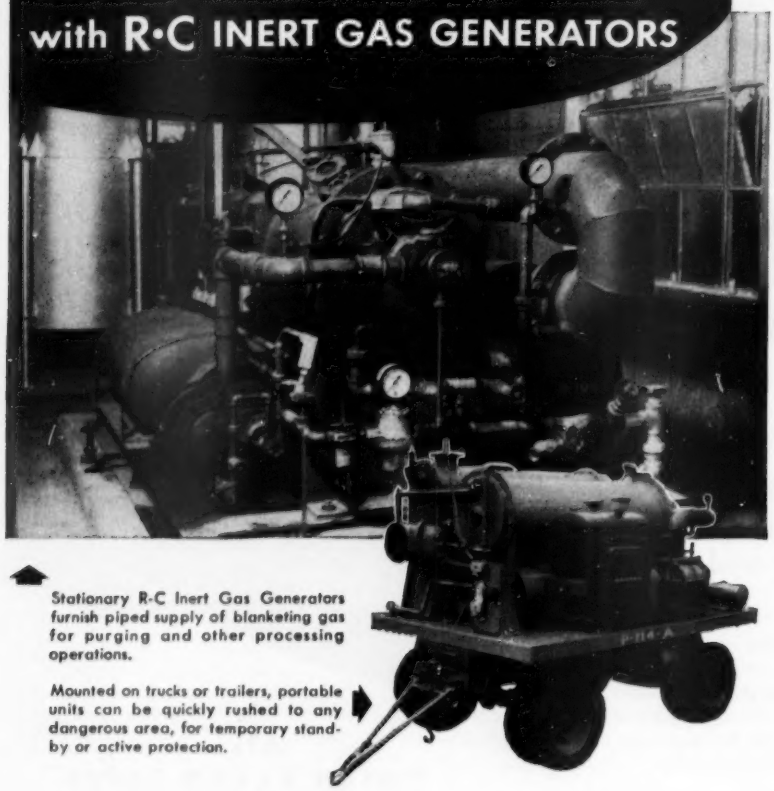
REDUCE EXPLOSION RISKS with R·C INERT GAS GENERATORS



Stationary R-C Inert Gas Generators furnish piped supply of blanketing gas for purging and other processing operations.

Mounted on trucks or trailers, portable units can be quickly rushed to any dangerous area, for temporary stand-by or active protection.

Where materials or processes may cause explosion-produced fires, such hazards can be greatly lessened by stand-by R-C Inert Gas Generators.

From stationary or portable units, a continuing flow of inert gas will blanket dangerous areas or can be used for purging explosive gas or liquid lines. Using either oil or gas as fuel, they operate at very low cost. Frequently, the comparatively small investment can be absorbed by more favorable insurance rates.

Units are available in capacities from 1,000 cfh to 50,000 cfh, with characteristics to match specific requirements. Write for details on how your fire and explosion risks may be reduced with R-C Inert Gas Generators . . . built by the specialists in equipment to handle gas and air.

ROOTS-CONNERSVILLE
Exclusive Specialists in Handling Gas and Air

ROOTS-CONNERSVILLE BLOWER A DIVISION OF DRESSER INDUSTRIES, INC. 534 Central Ave. • Connersville, Indiana

Good Ways to Solve Special PLANT ENGINEERING PROBLEMS

You can get catalogs suggested as answers to these problems by using coupon on page 154 or 244.

LOOKING FOR A TILE PIPE THAT'S EASY TO INSTALL above or below ground? Look no farther, says Robinson Clay Product Co. Its new "Screw-Seal" industrial pipe for handling fumes and wastes makes a tight acid-resistant joint in seconds. Won't leak when deflected up to 6 degrees. *(Circle No. 29 on coupon, page 154 or 244.)*

HAVE YOU THOUGHT OF SOLVING YOUR HEATING PROBLEM ELECTRICALLY? General Electric Co. suggests its Calrod heaters and heating devices. A 60-page catalog (No. GEC-1005D) is packed with information on how you can put them to work in the plant. *(Circle No. 30 on coupon, page 154 or 244.)*

ARE BRAKE AND CLUTCH REPLACEMENT COSTS PILING UP? You can double brake or clutch life if you coat your lining with Cop-Sil-Loy, according to Cop-Sil-Loy, Inc. The brush-on coating is a copper-lead alloy that fills in minute scratches or pores and dry-lubricates surfaces. *(Circle No. 31 on coupon, page 154 or 244.)*

NEED MORE SANITARY WASTE TREATMENT CAPACITY without expanding existing facilities? Bionetic is a powder of preserved microorganisms that improves the biological activity of sewage waste. Reliance Chemicals Corp. says it will reduce septic tank sludge up to 70%, prevent plugging of drains, eliminate odors from tanks. *(Circle No. 32 on coupon, page 154 or 244.)*

Turn the page

Homoflex Hose—More use per dollar

Homoflex Hos e per dollar

Homofle ollar

Hom er dollar

Homoflex Ho e per dollar

IT LASTS LONGER . . . That's why Homoflex Hose saves you money. Workmen like it because they don't have to "fight" it. It's light, flexible, easy to handle, with no pre-set twist . . . and very strong for handling air, water, other fluids and gases. In addition to all this, R/M engineers found a way to make the parts of Homoflex Hose inseparable—adding still more to the life of the hose. If you want to lower your hose costs just raise your standards to Homoflex . . . Ask the R/M Distributor for Bulletin 6879. He'll tell you about other R/M hose types for steam, oil, suction, chemicals . . . also how you get MORE USE PER DOLLAR with R/M transmission, and conveyor belt and V-belts.

R/M

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings
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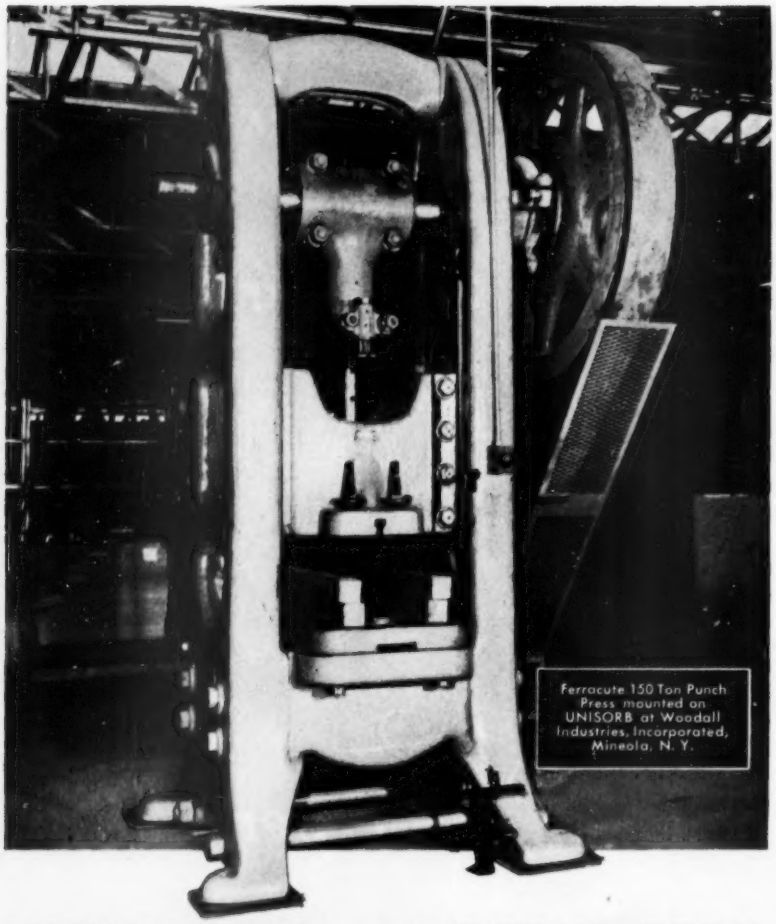

UNISORB MOUNTING

Helps You Eliminate 60% to 85% of All Transmitted Machine Vibration and Noise

Almost every kind of machine can be anchored on every kind of flooring the modern way . . . with UNISORB.

No bolts . . . no lag screws . . . no more unsightly, destructive floor drilling, either. A special cement, which we supply, binds the UNISORB pads to machine feet and floor with a holding strength of 1500 lbs. per square foot *minimum*.

What's more, the dramatic reduction in vibration helps increase the life of your machinery . . . saves building and floors. And the noise reduction can very well mean for your company, as it has for so many others, a positive benefit toward worker morale.

ACT NOW
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Offices: New York, Philadelphia, Chicago, Detroit, St. Louis
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MAIL COUPON FOR FREE BOOKLET TODAY!

Gentlemen: Please send my FREE COPY of "Why It Pays to Anchor Your Machinery with UNISORB."

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Company.....
Street.....
City..... *State*.....

Begins on page 246

Good Ways to Solve Special

PLANT ENGINEERING PROBLEMS

You can get catalogs suggested as answers to these problems by using coupon on page 154 or 244.

HOW TO PREVENT LEAKS IN CORRUGATED BUILDING CONSTRUCTION: You might investigate Fabco's closure strip, a molded corrugated gasket, and its isolation strip, for the prevention of electrolytic corrosion. In Bulletin No. 521, Fabricated Products Co. shows what each can do and where to use it. *(Circle No. 33 on coupon, page 154 or 244.)*

TO AVOID EXPENSIVE FLOORING REPAIRS caused by dampness, why not use a dry-concrete base? Hydropel, a water-resisting admix, imparts to the concrete high strength and resistance to moisture absorption and abrasion. American Bitumuls & Asphalt Co. will give you all the details. *(Circle No. 34 on coupon, page 154 or 244.)*

WANT TO CUT MACHINE DOWNTIME caused by plugged coolant lines? You can clear a line in five minutes with the Lincoln Valve, claims Production Time Savers, Inc. Just disassemble the 3-piece unit, lift out the chips, and reassemble. Anybody can do it. *(Circle No. 35 on coupon, page 154 or 244.)*

ONE WAY TO REDUCE COST OF GROUNDS CARE: Prevent or eliminate weeds and brush before they grow. Brulin & Co., Inc., says you can do it with its chemical weed killers. There are four different types for specialized weed or brush control. Just spray or sprinkle on wherever needed. *(Circle No. 36 on coupon, page 154 or 244.)*

Turn the page

LOAD FOR LOAD!

ROCKBESTOS AVA

COSTS LESS INSTALLED

For example, take a 430 ampere load at 40°C Ambient temperature. To use type RH cable, an 800 MCM is required but with Rockbestos AVA, a size 500 MCM cable carries the same load and is 38% smaller.

Three 800 MCM type RH cable requires a 4" conduit, while with Rockbestos AVA, a 3" conduit does the job. What's more, the quicker, easier handling of lighter-weight Rockbestos AVA reduces labor costs substantially.

Compared size for size, Rockbestos AVA (AVC) helps you increase capacity simply by rewiring old conduits. No new larger conduit, fittings and accompanying labor are needed.

All because Rockbestos AVA (AVC) insulation's dielectric strength is *so well protected* it takes less to do the job . . . and assure maximum dependability through the years. Write for booklet "Cut Current Carrying Costs".

It's the A.V.C. "Sandwich" that makes the difference.

Inner Felted Asbestos Wall
Varnished Cambric
Outer Felted Asbestos Wall
This "sandwich" protects the varnish cambric. It enables A.V.A. to carry more current than cables with conventional insulations.

ROCKBESTOS PRODUCTS CORPORATION

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CHICAGO WAREHOUSE: 727 W. Lake St., Chicago, Ill.

Good Ways to Solve Special PLANT ▶ OPERATING PROBLEMS

You can get catalogs suggested as answers to these problems by using coupon on page 154 or 244.

WANT TO LEARN THE ABC's OF TEMPERATURE MEASUREMENT AND CONTROL? Take a look at Partlow Corp.'s 24-page guide. It defines different types of control systems and points out how each should be used. You'll find down-to-earth descriptions of electrical and mechanical control theory and design. *(Circle No. 37 on coupon, page 154 or 244.)*

WHAT YOU CAN DO WITH AIR-TUBE SYSTEMS: Look what some other companies are doing, says Lamson Corp. Its 50-page booklet presents several case studies and suggest lots more uses. Technical data section gives the details on the component parts of the system. *(Circle No. 38 on coupon, page 154 or 244.)*

FOR HELP IN TRAINING FORK TRUCK OPERATORS, why not call on Yale & Towne Mfg. Co. Its Operator's Training Guide explains fundamental operations, outlines advanced techniques, describes safety and preventive maintenance procedures. Its Instructor's Manual tells you how to get the most out of the training program. *(Circle No. 39 on coupon, page 154 or 244.)*

FOR TEMPERATURE CONTROL ON INDUCTION HEATING, Leeds & Northrup Co. suggests its Rayotube. The instrument is part of a system that can automatically control temperature where available target area is extremely small—no bigger than a pinprick. Rugged and highly accurate. *(Circle No. 40 on coupon, page 154 or 244.)*

Turn the page

Within 7 minutes, he can cut your shipping costs!

This man is an expert in economical packing and sealing methods. He's your paper merchant who carries the world's largest selling gummed tape: Orange Core. If you're interested in ways to cut shipping costs, call him in. In just 7 minutes he'll tell you how you can save money while you speed your packing with Orange Core.

He'll show you how to use less tape, how to reduce your labor time. He'll show you how non-curling, *Supple-ized** Orange Core is good to the last inch. Send the coupon for Orange Core's folder, "How to make your shipping dollars go further." We'll tell you who your nearest dealer is.

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ORANGE CORE
GUMMED SEALING TAPE
CONSISTENTLY SUPERIOR

The world's largest selling gummed tape

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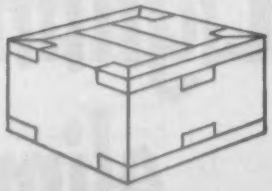
Did you know?



Gummed Tape is the only closure that dresses up your cartons

Your cartons look neater and more efficient with Gummed Tape. Every seam and corner is smoothly finished off with a closure of tape—"tailor made" to the job.

You can choose Gummed Tape in a variety of attractive, contrasting colors. You may have your tape printed, too, with your company name, trade mark, or message. Each carton becomes an advertisement for you.

Your shipments have more customer appeal when protected with Gummed Tape. They arrive at your customer's door in better condition . . . with their contents intact, too, sealed against dust, moisture, and vermin.

Even after your carton has been delivered and opened, it stays neat, because it opens cleanly and easily, without risk of injury to merchandise or hands.

Send for this helpful folder—TODAY!

"HOW TO MAKE YOUR SHIPPING DOLLARS GO FURTHER"

HUDSON PULP & PAPER CORP.
Dept. 48, 505 Park Ave., New York 22, N.Y.

I want my free copy of your informative folder, "How to make your shipping dollars go further" and give me the name of my Orange Core dealer.

NAME _____

COMPANY _____

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CITY _____ ZONE ____ STATE _____

"Lighting troubles eliminated,

thanks to the LUSTRA MAN,"

(*says Philadelphia Division of Solar Steel Corporation*)

Here's an unsolicited statement from Mr. Lewis Carley, Plant Superintendent:

"This plant, due to vibration and fluctuating voltage, has always had premature lamp failures . . . conventional incandescents burn out in 6 or 7 weeks. Six months ago we installed a group of Lustra Shockproof Lamps on a test basis. Not one of them has failed and we have since installed Lustra Lamps throughout the plant."

* * *

Like thousands of other plants, you will find that your local Lustra Man is a lighting specialist, ready and able to put a quick stop to the trouble and expense caused by premature lamp failures . . . with Lustra Shockproof Lamps.

On top of that, your Lustra Man is thoroughly qualified to give your plant the over-all lighting effectiveness that boosts operating efficiency . . . and to solve practically any special lighting problem with the full quality line of Lustra *Double Duty* Lamps, Fluorescent Tubes and allied electrical products. Write for literature giving the whole Lustra story. **Lustra Corporation, Dept. T-4, 36 Washington Street, Brooklyn 1, N. Y.**

Lustra

AMERICA'S DATED LAMPS

DOUBLE DUTY REFLECTOR LAMPS, INCANDESCENT LAMPS, FLUORESCENT TUBES, SPOTLITES AND FLOODLITES, RUGGED DUTY LAMPS, FLUORESCENT FIXTURES AND STARTERS

Begins on page 250

Good Ways to Solve Special

▶ PLANT OPERATING PROBLEMS

You can get catalogs suggested as answers to these problems by using coupon on page 154 or 244.

KNOW HOW TO MAKE A PICKLE BATH TEST? This and other pickling techniques are explained in American Chemical Paint Co.'s 80-page manual. Complete directions and big engineering data section make it ideal for standard reference. *(Circle No. 41 on coupon, page 154 or 244.)*

ARE YOUR PRECISION GRINDING JOBS GETTING TOO BIG for your grinders? Bullard Co. says you should use its vertical chucking grinding machies. Comes in 6 models—30 to 74 inches. Flexible, easy to operate. *(Circle No. 42 on coupon, page 154 or 244.)*

LOOKING FOR WAYS TO IMPROVE DIES? Meehanite Metal Corp. claims that dies made from Meehanite are ideal for long production runs. You get maximum wear resistance, hardness right on specs. *(Circle No. 43 on coupon, page 154 or 244.)*

NEED MORE STORAGE SPACE? You can get it with oblique stacking, says Baker-Raulang Co. Cuts down aisle requirements, makes possible faster stock selection and inventory checks. *(Circle No. 44 on coupon, page 154 or 244.)*

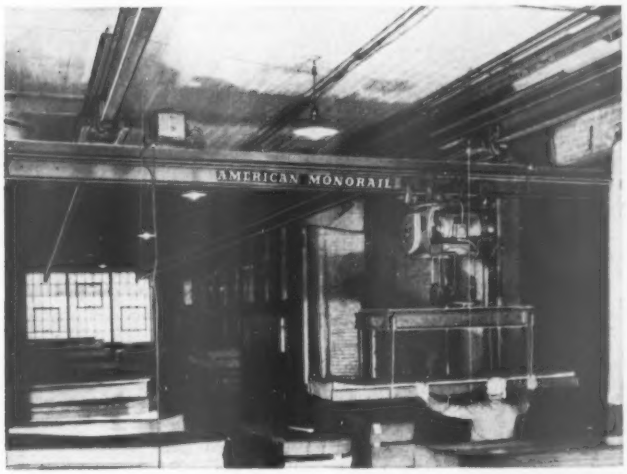
GOT A TAPPING PROBLEM? Here's a pocketful of answers, all wrapped up in Threadwell Tap & Die Co.'s 56-page manual. It contains tips on tapping, general tapping information, and tables of specs, speeds, and dimensions. Included is the latest Unified & American screw thread data. *(Circle No. 45 on coupon, page 154 or 244.)*

AMERICAN MONORAIL

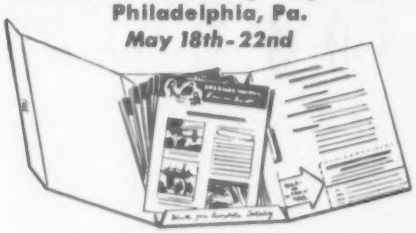
- **INCREASES PLANT CAPACITY AND PRODUCTION**
- **REDUCES HANDLING COSTS, DAMAGE AND LOSS**

American MonoRail Engineers can show you how to get more profitable production out of your plant by systematizing material handling. Let them show you how to convert lost ceiling space to profit—how to eliminate obstructive storage around machines—lessen worker fatigue—reduce heavy load accidents—stop damage to product in motion.

Bring us your handling problems —American MonoRail can provide the equipment best suited to your needs.



See our booth at the
5th National
Materials Handling Exposition
Philadelphia, Pa.
May 18th - 22nd



Send for New Case Study File

This brand new case study file contains the first of a continuing series of case studies covering many successful American MonoRail installations. Send today for original file. Future studies will reach you as published.

THE AMERICAN MONORAIL COMPANY

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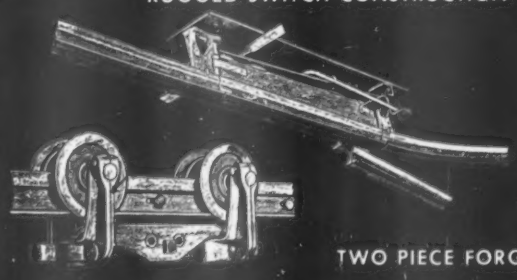
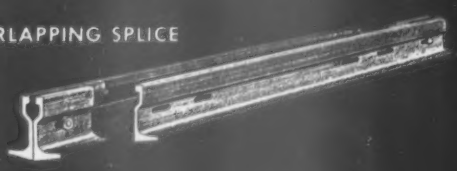
RUGGED SWITCH CONSTRUCTION



OVERLAPPING SPLICE



TWO PIECE FORGED YOKES

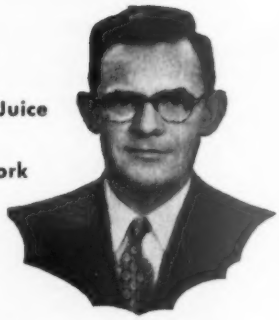
SCALE HOIST CARRIER

FREE MOVING CRANES

"WE GET BIG SAVINGS BY BURNING COAL THE MODERN WAY!

Other fuels would cost us far more!"

says
Mr. A. J. Monta,
Plants Engineer,
The Welch Grape Juice Company, Inc.,
Westfield, New York



"We analyzed the cost of coal and other fuels before modernizing our power plant. The result is this up-to-date coal installation that delivers steam at half the cost of competing fuels. *For economy you can't beat* bituminous *coal burned the modern way!*"

Modern coal-burning and handling equipment saves this plant more than 35% on labor alone! New stokers, boilers, controls and coal-handling equipment cut labor costs and save this plant 18% on fuel. The complete installation will pay for itself in about 6 years.

● Burning bituminous coal the modern way can save you money, too! Labor costs are cut to a minimum with up-to-date coal- and ash-handling equipment... modern combustion installations deliver anywhere from 10 to 40% more power from every ton of coal!

That's why, if you're planning to modernize or build a new plant, it will pay you to get the latest facts on coal. Let a consulting engineer show you how a modern coal installation designed to meet your specific needs can save you real money.

Here's something more! Today's bituminous coal customers get a better-prepared product—designed to meet their special requirements. And bituminous coal offers future dependability no other fuel can match. Reserves are virtually inexhaustible, and America's coal industry is the world's most efficient —your assurance of dependable supply of coal at relatively stable prices for years to come.

If you operate a steam plant, you can't afford to ignore these facts!

COAL in most places is today's lowest-cost fuel.

COAL resources in America are adequate for all needs—*for hundreds of years to come.*

COAL production in the U.S.A. is highly mechanized and by far the most efficient in the world.

COAL prices will therefore remain the most stable of all fuels.

COAL is the safest fuel to store and use.

COAL is the fuel that industry counts on more and more—for with modern combustion and handling equipment, the inherent advantages of well-prepared coal net even bigger savings.

BITUMINOUS COAL INSTITUTE
A Department of National Coal Association, Washington, D. C.

FOR HIGH EFFICIENCY ... FOR LOW COST

YOU CAN COUNT ON COAL!

You can't stop a bear with a fly swatter

You can't stop corrosion with ordinary paints... it takes BITUMASTIC COATINGS!

CORROSION can't be stopped by ordinary paints or conventional protective coatings. They can't protect surfaces against the ravages of rust for any appreciable length of time. But Bitumastic Coatings can!

BECAUSE the six Bitumastic® Protective Coatings, unlike maintenance paints, are specially formulated from a coal-tar pitch base* that is, for all practical purposes, impervious to water. When you keep moisture away from an exposed surface, you *stop* corrosion.

BECAUSE Bitumastic Coatings provide an extra-tough, extra-thick barrier against corrosive elements—a barrier that is impenetrable. These coatings provide up to 8 times the film thickness of conventional paint coatings.

BECAUSE Bitumastic Coatings stop corrosion caused by moisture—acid fumes—alkaline fumes—salt air—heat.

There are 6 Koppers Coatings—formulated to control corrosion of metal and deterioration of concrete. Use the coupon for full information, or see our catalog in Sweet's Plant Engineering File.

**Hi-Heat Gray contains a metallic base.*

SEND FOR SET OF FREE BOOKLETS!

Koppers Company, Inc., Tar Products Division
Dept. 453-T, Pittsburgh 19, Pa.

Please send me, without charge or obligation, complete information on corrosion prevention.

Name.....

Address.....

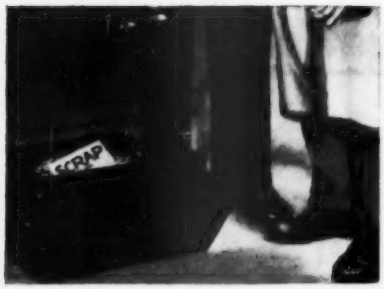
City..... Zone..... State.....

KOPPERS BITUMASTIC PROTECTIVE COATINGS

SOLD THROUGH INDUSTRIAL DISTRIBUTORS

KOPPERS COMPANY, INC., Tar Products Division, Dept. 453-T, Pittsburgh 19, Pa.

DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, AND WOODWARD, ALA.



If the operator could see what he's doing we wouldn't have all this scrap!

DON'T ACCEPT THOSE PILES OF SCRAP as an unavoidable byproduct of production! This loss is *not* necessary. Just because your old style, fixed-type gages are as good as the day you bought them—and they're paid for—don't overlook their part in producing excessive scrap. With these obsolete gages workpieces are *right*, or *wrong*, and the operator cannot know when a dimension is approaching limits until after scrap results. With Federal Indicating Gages, however, the pointer on the dial *shows* exactly how a workpiece conforms to specifications and machine adjustments can be made to correct errors *before* they occur.

Whatever kind of indicating gage you require—air, mechanical, electronic, or electrical—we have just what you want. Fill in the coupon and mail it to us today. Federal Products Corporation, Providence 1, Rhode Island.

With this Arnold Grinding Gage—no time lost while gaging . . . no interrupted production . . . no overgrinding or scrap.

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Largest manufacturer devoted exclusively to designing and manufacturing all types of DIMENSIONAL INDICATING GAGES.

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1334 Eddy Street, Providence 1, R. I.

☐ I would like to discuss a gaging problem with you. ☐ I am interested in your latest improved gage or gages and enclose ☐ sketch ☐ blueprint showing the dimension(s) we wish to check.

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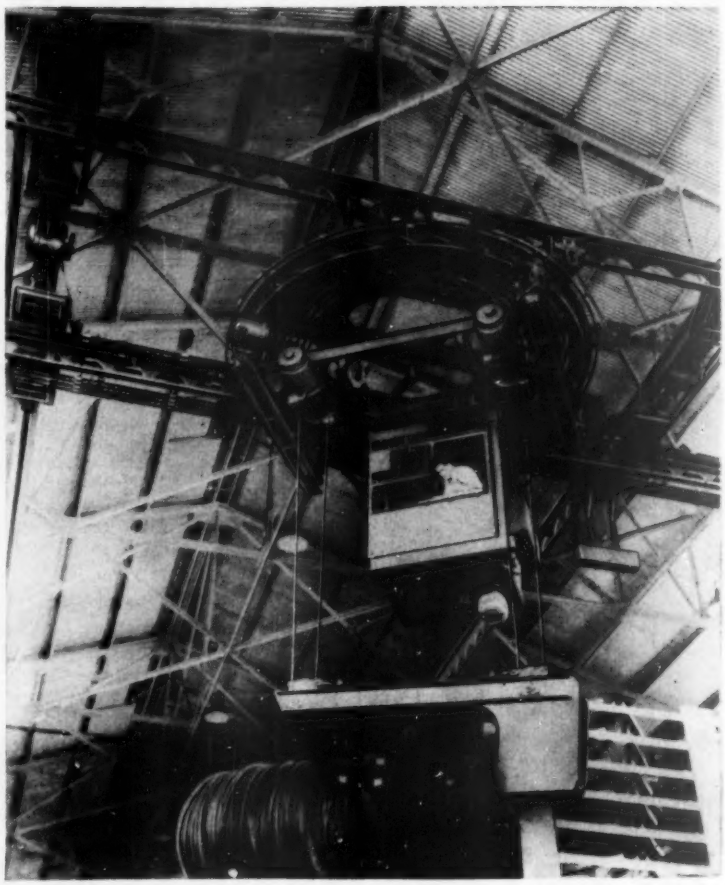
STREET .....

CITY ..... STATE .....



FIVE-WAY OVERHEAD CRANE for handling coils of wire in close quarters. For details, see page 264. It's an example from Material Handling Institute's . . .

SPECIAL REPORT ON

New Handling Equipment

MATERIALS HANDLING EQUIPMENT is changing fast. It has to in order to meet the expanding and specialized needs of industry. So the Material Handling Institute, New York, decided to take stock of what came on the market in the way of new and improved handling equipment during 1952. To do the job, it surveyed its entire membership of 79 materials handling equipment manufacturers for new product information.

The big trend. According to MHI, it is greater specialization of equipment. That becomes obvious when you take a look at the special-purpose fork trucks, attachments, cranes and hoists, pallets, belt conveyors, and other equipment covered in the survey.

Here's a rundown on the results. You'll also learn about some other important industry trends, as seen by the institute.

More text on next page

More pictures on page 260

Coffing now offers— A Complete Spur-Gear Hoist Line

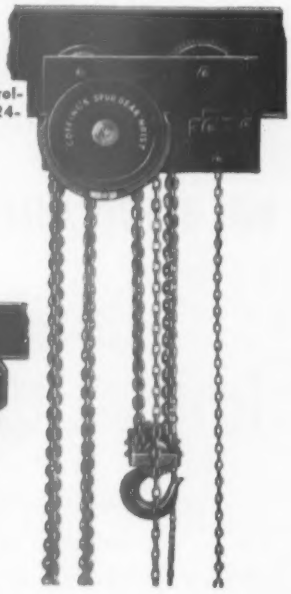
Available in capacities from ¼ to 25 tons. This new line consists of regular spur-gear hoists, army and low-head-room trolley types (with either plain or geared trolleys), extended hand wheel, and clevis-connected hoists.

Now your Coffing distributor can take care of all your spur-geared hoist requirements. That means something to you, because you can depend on good Coffing quality and service, on this extended line, to lower your maintenance costs.

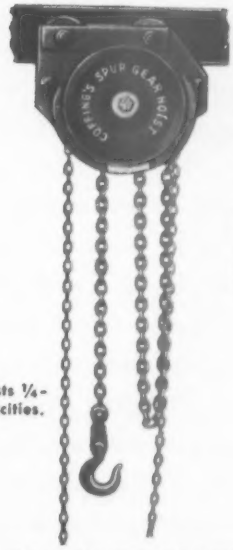
Contact your Coffing distributor or write us for bulletins and his address — Dept. M4Y.

Model YCT Timken Bearing Hoists ¼- to 12-ton capacities.

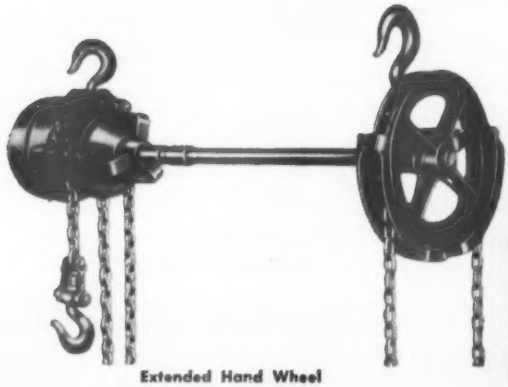
Model YCT Timken Bearing Hoists 12- to 25-ton capacities.



Low-Head-Room Trolley Hoists 1½- to 24-ton capacities.



Army-Type Hoists ¼- to 10-ton capacities.



Extended Hand Wheel Hoists ¼- to 3-ton capacities.

See us in Booth 407 of the Materials Handling Show — Philadelphia, May 18 to 22.

COFFING HOIST COMPANY

WIRE-BRAIDED RUBBER HOSE IN *Economy* LENGTHS

Now! From the world's newest, most modern equipped factory comes a complete line of wire-braided rubber hose. Made in lengths that are economically adaptable to your requirements!

Republic WIRETEX Hose has all the desirable characteristics of flexible, high-quality rubber hose. It bends naturally to fit any connection. It's not weakened by vibration or flexing. It resists a wide span of temperature variance between—40° F. and +200°F. It's oil, grease and abrasion-resistant and won't rust or corrode.

Republic WIRETEX Hose is continuously reinforced with multiple braids of wire that maintain diameter dimensions despite high-pressure surges from 400 to 5,500 p.s.i. Republic WIRETEX Hose is available with either rubber or textile covers. Get the facts today! Whenever selection requirements for high, medium or low-pressure carriers for any gases or liquids demand hose of great strength, flexibility and long life, your answer is Republic WIRETEX!

REPUBLIC RUBBER DIVISION

LEE RUBBER & TIRE CORPORATION, YOUNGSTOWN 1, OHIO

INDUSTRIAL RUBBER PRODUCTS

MATERIALS HANDLING

Begins on page 256

FORK TRUCKS

The outstanding changes on both gas and electric models:

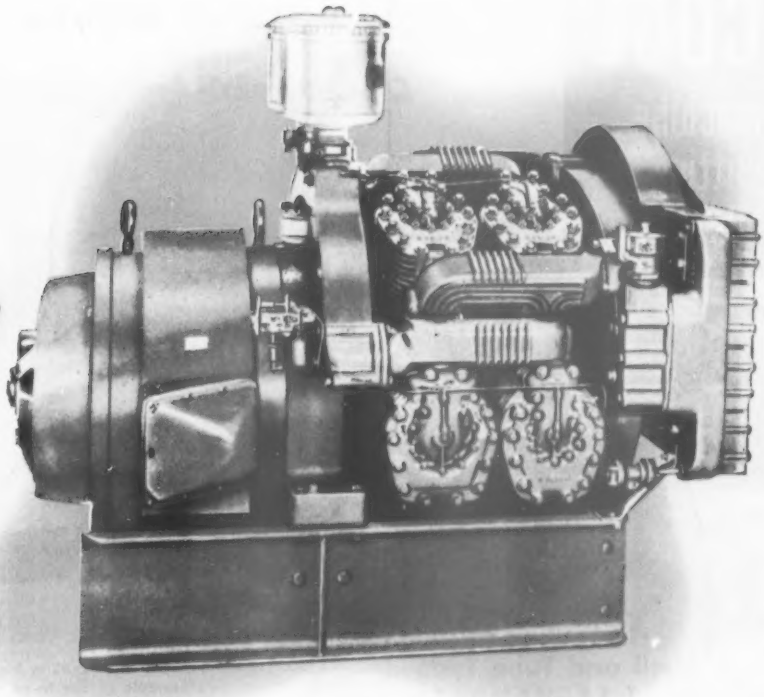
- **For heavy industry jobs.** Manufacturers have introduced heavy-duty models for special jobs like furnace-charging and pushing heavy meat carcasses.
- **For warehouse use in narrow aisles.** There's a big trend toward use of narrow aisles. And at least two companies came out with new models of compact outrigger-type trucks that can operate and maneuver in a minimum of aisle space. In addition, higher lifts make possible higher stacking — another space saver.
- **For handling longer loads.** Extra-long platform lengths appeared (see photograph of one model on page 260).
- **For more efficient control of fork truck operation.** Better methods of truck control and dispatching were introduced by more companies. The systems ranged from simple, scheduled pick-up routes to telephone-call systems and elaborate two-way radio hook-ups.
- **For powering fork trucks.** There were several additions here. Diesel-electric trucks came on the market. Battery manufacturers made some changes, too. In addition to improving some standard items, at least one company replaced rubber with corrosion-resistant plastics to retain active battery materials. New lead alloys and grid improvements were brought in, for greater capacity and longer life.
- **For faster fork adjustment.** During 1952 one company introduced a screw mechanism to speed and simplify lateral adjustment of forks.

FORK TRUCK ATTACHMENTS

Again the emphasis is on specialization, with greater attention to solving problems for specific industries—like paper, oil, cot-

Text continues on page 262
Pictures on page 260

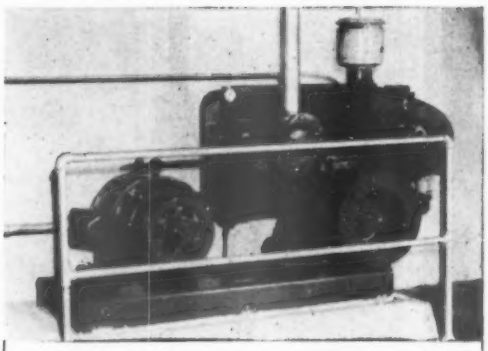
JOY WL-80 COMPRESSOR with automatic start and stop control



A Real "Package-Unit"

Joy WL-80's are ideal for the smaller air-requirement jobs, or for de-centralized air supply, etc. These two-stage, air-cooled units are delivered ready-to-go, complete with air receivers, piping and wiring if you wish—just hook them up to power and air lines. Extremely compact and efficient, a WL-80 will fit into any small corner of your plant. You can eliminate long runs of piping; compress the air right where you use it. Available in eleven sizes from 15 to 125 HP, 81 to 641 CFM, with pressures to 125 PSI, for service indoors or out. ● *Write for Bulletin A-56.*

Joy also makes a complete line of Oil-Free Compressors for applications where air must be free of any lubricant. *Write for details.*



JOY COMPRESSORS **meet any need!**

Air-cooled or heavy duty water-cooled; complete range from 1.4 to 8800 CFM, ¼ to 600 HP.

Consult a Joy Engineer

Over 100 Years of Engineering Leadership

W&D 1 4060

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

COOL
machine
cutting
oils with...

YOUNG
Shell and Tube Type
HEAT EXCHANGERS

Efficient cooling of tool cutting oil used for machining aluminum parts at a large Midwest die casting company is being done by Young two-pass, shell and tube, fixed bundle Heat Exchangers. By lowering oil temperatures at the cutting tools, seven Acme-Gridley chucking machines are operating at maximum production speeds. In addition, the aluminum parts are easier to handle. For further details, see your Young Representative, or write direct.

COMPLETE LINE IS COMPACT...EFFICIENT

Type "F"
Single pass, fixed tube bundle, 48 stock models
Two pass, fixed tube bundle, 48 stock models
Type "R"
Single pass, removable tube bundle, 258 models
2-pass removable tube bundle, 258 models

YOUNG

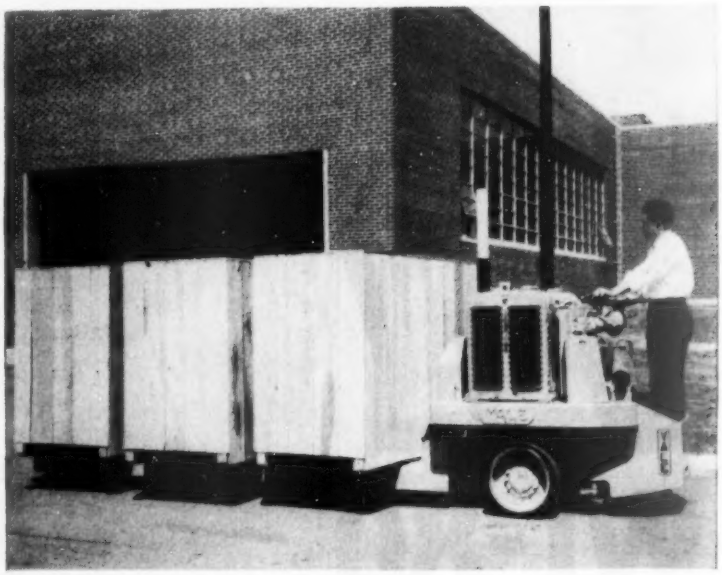
Heat Transfer Products for Automotive and Industrial Applications.

Young Quality

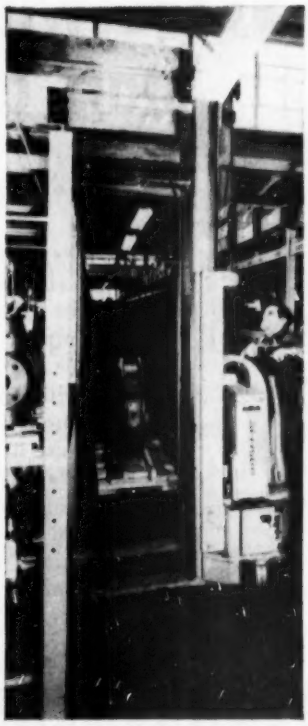
Heating, Cooling, and Air Conditioning Products for Home and Industry.

T. M. REG. U. S. PAT. OFF.

YOUNG RADIATOR COMPANY
Dept. 803-D • RACINE, WISCONSIN
Factories at Racine, Wisconsin and Mattoon, Illinois



EXTRA-LONG TRUCK for handling bigger loads can save trips for your truck operators. It's another example of the trend toward larger capacity equipment reported in the Materials Handling Institute survey.



SPECIAL ATTACHMENTS, like this drum handler, point up a trend toward more attachments for the solution of specific handling problems. Unit pictured above carries four drums.

EXTRA-COMPACT FORK TRUCKS are designed for high stacking in narrow aisle warehouse areas. Material Handling Institute reports more manufacturers making this type of equipment. Outrigger at the base gives necessary stability to the truck.

Turn the page

NOW there is a way to get THE FACTS —get them fast, direct, on the record—

and THIS IS I.T.*

***Industrial Televoice,** EDISON's new floor-to-management communications system . . . Here, at last, is a "fact conveyor" that works—because it's easy. It's easy for the man on the production floor: he doesn't write anything—he just talks. And it's equally easy on the man at the management control point: he doesn't have to listen to the talk—he reads it!

A network of TELEVOICE phones is installed wherever vital information originates—and connected to central recording equipment in the appropriate department. Reports and requests are "phoned" in from the floor and recorded on plastic discs. At frequent intervals, the recorded information is transferred to your forms and distributed for action, control or analysis. That's all there is to it!

New as it is, INDUSTRIAL TELEVOICE has already proved its value in controlling and coordinating production, inspection, maintenance and shipping and receiving. But the whole story has yet to be written. In your plant, you'll probably discover additional applications we haven't even dreamed of.

Once you see INDUSTRIAL TELEVOICE in action, you'll recognize it as the *communication* system that makes *operating* systems work.

Industrial EDISON TELEVOICE

Ask for trial demonstration!

We'll be glad to arrange a trial demonstration of EDISON INDUSTRIAL TELEVOICE in your plant. Just send the coupon—or contact your nearest EDISON VOICEWRITER representative (see classified directory).

Thomas A Edison INCORPORATED

EDISON *(Ediphone Division)*, 3 Lakeside Ave., W. Orange, N. J.

Yes, EDISON, I want information on a trial demonstration of INDUSTRIAL TELEVOICE.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

NONE BETTER... America's First and Safest

HERC-ALLOY

SLING CHAINS

STRENGTH—Size for size, no other sling chain offers a greater tensile strength. HERC-ALLOY will not crystallize—never requires annealing.

SAFETY—HERC-ALLOY Sling Chains are made to your specifications. Every new sling carries a written guarantee, is registered and tested before shipping. This registration serial number is carried at the top link.

● Serial number permanently affixed near top link for positive identification.

● Identify HERC-ALLOY by the patented Inswell side weld with the extra swell of metal on the inside of the link.

EFFICIENCY—Lighter, stronger HERC-ALLOY Sling Chains feature the exclusive short, narrow link design which holds firmer, less tendency to kink, less gouging. Workmen handle HERC-ALLOY with less effort.

PREFERENCE—Men who buy and use sling chains are influenced only by facts learned through experience. HERC-ALLOY Sling Chain preference has been built up over the years, not just by what we say, but by how HERC-ALLOY performs on the job.

Write for Data Book No. 3 which contains much useful manufacturing and application information on HERC-ALLOY Sling Chains.

COLUMBUS McKINNON CHAIN CORPORATION

(Affiliated with Chisholm-Moore Hoist Corp.)

GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.

***District Offices:* New York • Chicago • Cleveland**

Other Factories at Angola, N. Y., Dixon, Ill., St. Catharines, Ont., and Johannesburg, South Africa.

See us at Booth No. 1526—Philadelphia—May 18-22
5th National Material Handling Exposition

Begins on page 256

ton, and the like. Availability of special attachments, of course, broadens the scope of standard truck units.

Here are some of the newer attachments:

• **Barrel and drum handling attachments.** Other versions appeared. With one of them you can carry two different sizes of drums at the same time. They can be fixed to the forks in a matter of minutes.

• **Roll handlers.** With a new type of roll handler you can pick up a heavy roll from any position, turn it through 360 degrees if necessary, lift and stack it.

• **Detachable counterweights.** These are especially useful where you want to transport trucks in light-duty elevators or shipyard cranes. All you have to do is detach the counterweight, transport counterweight and truck separately, then reassemble. One maker reports a new model of this type.

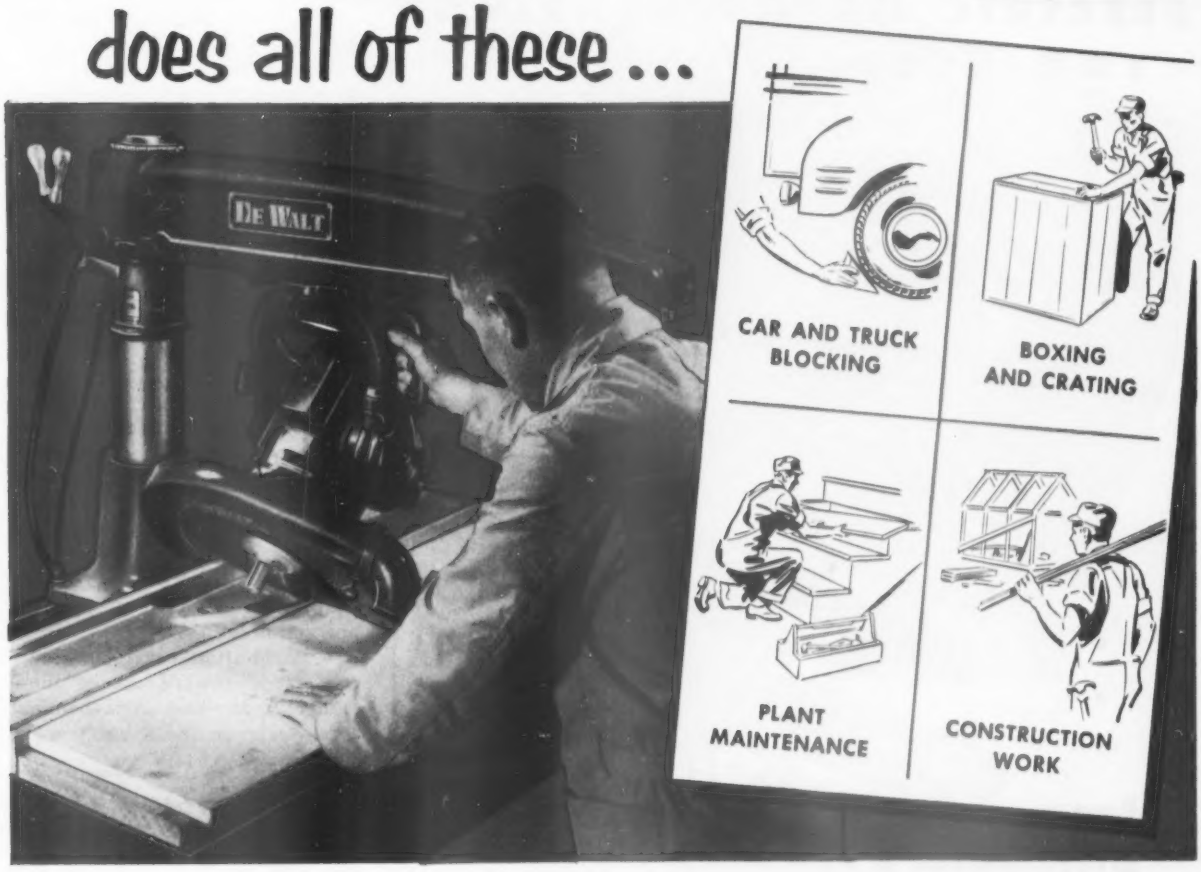
OVERHEAD CRANES AND HOISTS

Progress in design came in several phases of equipment operation.

• **Special lifting tackles.** Many were introduced for specialized handling jobs—such as double-hook cranes with hairpin attachments for handling coils of wire

Turn the page

So Fast! So Easy! One Low Cost DeWalt does all of these...



Here's a small investment that pays off big for you, because it does so many jobs—quickly and economically. A DeWalt® Power Saw is the ideal answer to your plant maintenance and utility cutting problems.

DeWalt is a complete power unit in one machine. You rip, miter, bevel, tenon, dado, plough and make many other cuts. And you can also grind, sand, drill and even do light metal cutting. All these operations are performed quickly and easily, because DeWalt has amazing flexibility...cuts with lightning speed.

You get famous DeWalt precision and safety, too. The DeWalt Safety Guard gives maximum protection at all times.

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Available in five models from ½ to 10 H.P.

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Subsidiary of
AMERICAN MACHINE & FOUNDRY COMPANY
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☐ Please send me full details on the De Walt Radial Power Saw Line.

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ANY
ELECTRIC MOTOR BEARING YOU NEED . .

JOHNSON BRONZE offers you a complete service on electric motor bearings. The Catalog illustrates and lists these bearings by manufacturers' numbers, motor type, frame or model number, and complete size data, as well as the Johnson part number. Be sure you have the latest catalog for reference and ordering from your local distributor.

Johnson EM Bearings are correct in design and tolerance, and made of an alloy that will meet toughest operating conditions. They slip right into position without additional work. For satisfactory results, use Johnson EM Bearings.

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512 So. Mill Street • New Castle, Pennsylvania

JOHNSON Sleeve-B BEARINGS Type

Sleeve Bearing Headquarters Since 1901

From Distributor's Stock

Johnson EM Bearings

MATERIALS HANDLING

Begins on page 256

in liquid treatment tanks. Another newcomer is a motor-driven expanding cable-reel arbor. All operations, including the arbor expansion, are remotely controlled. A double hoist turns the reel.

• **Special purpose cranes.** An overhead model with five separately controlled movements (see photo, page 260) answers the problem of handling coils of wire in close quarters. In addition to hoist, trolley travel, and bridge travel, two hoisting motors permit the operator to tilt the load. Hoisting element is mounted on a circular track attached to the trolley. You can rotate through 360 degrees, as the fifth motion.

• **Fluid drives.** They've been adapted for overhead crane use by one manufacturer.

• **Pushbutton controls.** There is a trend toward use of these rather than the rope-pendant type—even on the less expensive hoists.

BELT CONVEYORS

Rubber is still the most popular belt material. But several special-purpose belts appeared:

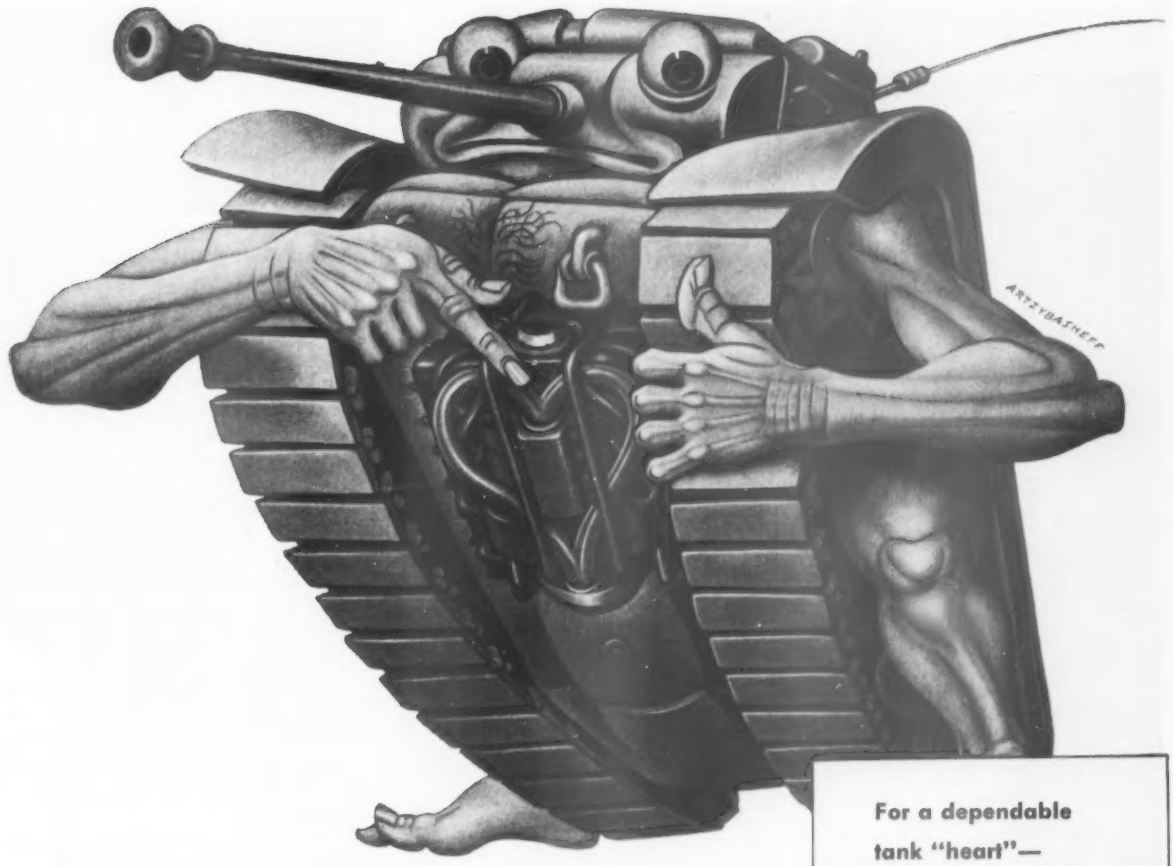
• **A rubber belt with molded-on rubber fittings.** A food cannery uses a model with lugs molded to the sides of the belt. It reduces the cooling time for cans of food. The lugs jiggle the cans in a stream of cold water as they go from labeling to shipping. And other specially-molded types point up the importance of the trend. A rough-top rubber belt for carrying packages up steep inclines—once a "special" design—is now a standard item.

• **Metallic belts.** There was more interest by manufacturers in metal conveyor belts, even for bulk handling.

PALLETS, BOXES, AND BINS

Wider use of pallets was helped by the introduction of several new kinds of pallets and pallet-boxes.

Turn the page



New "ticker" for tanks

Rumbling over rugged terrain . . . crushing enemy obstacles . . . surviving heavy fire—our "G.I." tanks must have powerful, dependable engines to stay "alive" in combat. That's why the Army Ordnance Corps relies on Lycoming to turn out air-cooled "tickers" for new-type tanks now in production.

Maybe you need a complete engine, or a single precision part. Maybe you have "only an idea" in the rough or blueprint stage that needs development. Or a metal product that needs precise and speedy fabrication. In *any* case—look to Lycoming! Lycoming has a long-tested reputation for meeting the most exacting and diverse metal-working requirements, both industrial and military. *Whatever* your problem—look to Lycoming!

Lycoming's wealth of creative engineering ability, its 2½ million square feet of floor space, its 6,000-plus machine tools stand ready to serve your needs.

AIR-COOLED ENGINES FOR AIRCRAFT AND INDUSTRIAL USES • PRECISION-AND-VOLUME MACHINE PARTS • GRAY-IRON CASTINGS • STEEL-PLATE FABRICATION

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LOOK TO LYCOMING

LYCOMING-SPENCER DIVISION, WILLIAMSPORT, PA.
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For a dependable tank "heart"—500 horsepower's worth of rugged air-cooled engine—U. S. Army Ordnance looks to Lycoming's precision production.

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Please send me further information on Lycoming's varied abilities and facilities.

Name_____

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SLOWDOWN In Assembly?

Not when you bundle with a SIGNODE POWER STRAPPING MACHINE!

The happiest, most envied man on the production line—*and the pacesetter*—is the man on the *Signode Power Strapping Machine!* His job is easy and light, and well-strapped bundles roll off the line automatically! But faster continuous output is not the only advantage gained.

Power Strapping Cuts Costs Also

Signode's Power Strapping Machine releases several men for other jobs. It does the job of bundling safe and faster, with uniform tension on every strap. The machine is flexible, handling packages of varying sizes without adjustment. It is highly adaptable, strapping K.D. millwork, soft and hard wood flooring, shingles, crating lumber, expensive trim, etc. Strapped millwork and lumber is easier to handle, stack and tally. It can be loaded faster and enjoys protection from pilferage until used on the job.

Let's estimate your needs

Volume shippers usually have varying strapping needs. Let our fieldman survey your production layout and recommend the power strapping machine for the job. You'll be under no obligation whatever. Write

*Another exclusive service proved and tested for you by Signode

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Steel Strapping Company

2663 N. Western Ave., Chicago 47, Ill.

this seal means security in shipping

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Offices coast to coast.
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MATERIALS HANDLING

Begins on page 256

• **Multiple-trip pallets.** You can get more different models in combinations of wood and metal, all-wood, and all-metal.

• **Pallet dollies.** The rollers are fixed integrally on the pallet base. One manufacturer introduced a new model during 1952.

• **Special purpose tote boxes and bins.** Several appeared. Controlled-discharge side gates permit faster emptying on one side-opening metal box.

CRAWLER AND TRUCK CRANES

New attachments for crawler-mounted and rubber-tired cranes and bulk-handling equipment permit you to do special jobs with basic standard equipment.

• **For unloading pulpwood rack cars.** A parallelogram arrangement keeps the pushing plate perpendicular to the log ends throughout the cycle of movement.

• **For low headroom.** A scoop-shovel attachment brought out by one maker can operate in 10-ft. 6-in. headroom.

• **For smooth operation.** More manufacturers of crawler and truck-mounted cranes adapted hydraulic and magnetic clutches to this type of equipment.

VERTICAL TRANSPORTATION

The big trends in multiple-story buildings:

• **Electronically-controlled elevators for freight and passenger traffic.** They increase the speed and efficiency of vertical travel.

• **Self-leveling power doors.**

• **Integration of elevator with the over-all plant system.** That's a big help in getting increased production from older buildings.

TERMINAL AND WAREHOUSE HANDLING

To accommodate new methods of handling railroad and shipboard freight this equipment was introduced:

• **A cable towing system.** It's for moving small trucks in large

Turn the page

when a job takes guts here's the gearmotor that has it . . . .

Here's a Foote Bros.-Louis Allis Gearmotor Driving a pay-off reel at the new U. S. Steel Fairless mill.

Rugged service and intermittent loading are characteristics of this job and the compact, low-cost, highly-efficient Foote Bros-Louis Allis Gearmotor was chosen because of its ability to render that service.

These gearmotors incorporate Duti-Rated Gears, with file-hard tooth surfaces and ductile cores, assuring maximum strength with minimum size and weight. Available in single, double and triple reductions, to provide output speeds of 780 down to 7.5 r.p.m.

FOOTE BROS. GEAR AND MACHINE CORPORATION
4545 South Western Boulevard • Chicago 9, Illinois

Pay-off Reel manufactured by The Aetna-Standard Engineering Co. installed in the Fairless Mill of the U. S. Steel Corporation

Hygrade Drives

Line-O-Power Drives

Maxi-Power Drives

FOOTE BROS.

Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION
Dept. I, 4545 S. Western Boulevard, Chicago 9, Illinois

Please send me Bulletin GMA containing full information on Foote Bros.-Louis Allis Gearmotors.

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Company.....

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Position.....

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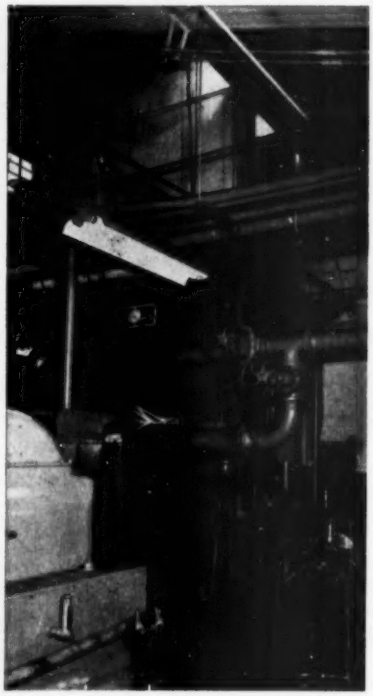
You Get Trustworthy Liquid or Gas Cooling With Great Cooling Water Savings from the NIAGARA AERO HEAT EXCHANGER

● You can cool air, gas, water, oils, chemicals, electric and power and process equipment, engines, mechanical processes with lower cost and really accurate control of temperature with the Niagara Aero Heat Exchanger.

• You are assured of uniform, constant production and quality from any process . . . steady, reliable operation . . . lower cost for more dependable cooling. You can have closed system cooling with freedom from scale, dirt, corrosion and maintenance troubles. You can accurately cool more than one type of liquid with one machine.

The Niagara Aero Heat Exchanger uses atmospheric air to cool liquids and gases by evaporative cooling. You can remove heat at the rate of input to keep accurate control of gas or liquid temperature. You can put heat back into the system to save the losses of a "warm-up" period or to equalize the effect of load variations.



Great savings in cooling water and savings in piping, pumping and power return the cost to you quickly. The Niagara Aero Heat Exchanger can save you approximately 95% of your cooling water cost. Write for Bulletin 120.

NIAGARA BLOWER COMPANY

Over 35 Years Service in Industrial Air Engineering

Dept. F, 405 Lexington Ave. New York 17, N. Y.

Experienced District Engineers in all Principal Cities of U.S. and Canada

MATERIALS HANDLING

Begins on page 256

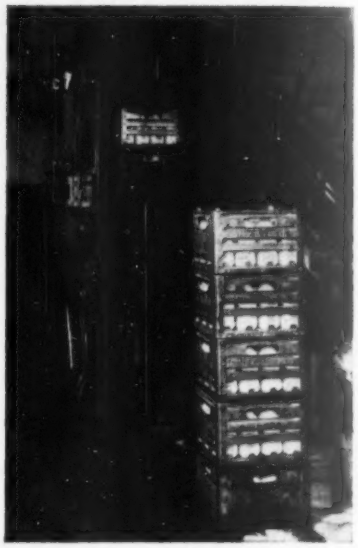
railroad freight stations or warehouses. Trucks are propelled by the moving cable sunk into a conduit in the floor. They can be moved directly across railroad tracks without need for bridge.

• **Portable bulkheads.** One model brought out in 1952 is reusable. It requires no special tools for installation or removal.

PACKAGING

Several new developments to report here:

• **Adjustable nailer.** One automatic box-lidder nails tops on a wide range of box sizes without manual adjustment. Automatic chucks hold the box while positioning the nailing heads for each side.



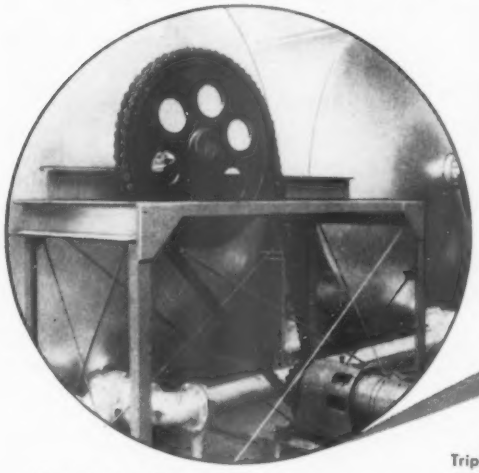
• **Vertical stacker.** One originally designed for handling cases of milk bottles can be used for other goods. It's fed from the top. When a predetermined number of cases are aboard, it automatically releases the stack to a conveyor and begins a new stack.

• **Package strapping.** A new machine automatically tensions the steel strap, cuts it from the coil, and joins the overlapped ends with two spot welds.

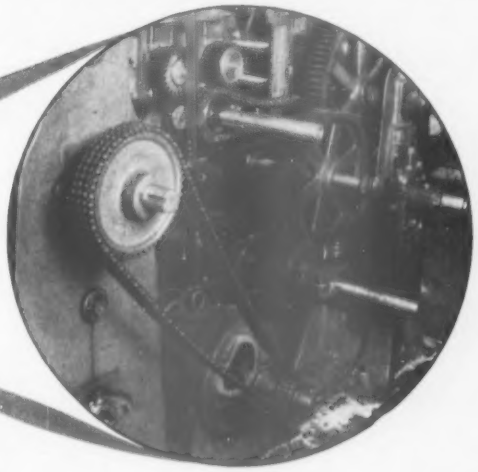
Turn the page

In your plant, too

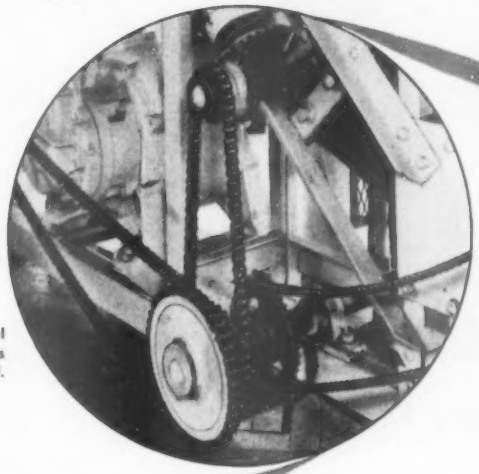
there are many jobs DIAMOND ROLLER CHAINS can do most effectively



Agitator drive 5-ft. center distances. Exact slow speed of agitator assured. (Guard removed to show No. 478 Diamond Roller Chain).

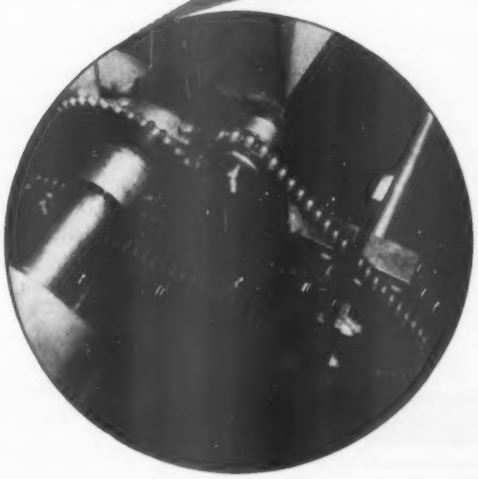


Triple strand chain from motor with another shaft to shaft drive above.



Power source to several shafts at speeds selected as required.

Plant drive in wire mill—driven shaft above is rotated in opposite direction to driving shaft (below).



• For high speed drives from motors, drives from shaft to shaft or one shaft to several others, Diamond Roller Chains provide ideal operation. They are non-slipping, highly efficient (98-99%) and insure reliable top output for many, many years of service.

You will find many applications in your plant where Diamond Roller Chains can serve you. Catalog 709 gives basic chain and sprocket data—copy on request.

DIAMOND CHAIN COMPANY, Inc.
Where High Quality is Tradition
Dept. 449, 402 Kentucky Avenue
Indianapolis 7, Indiana
Offices and Distributors in All Principal Cities

Refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

Shot-Peening Since 1944

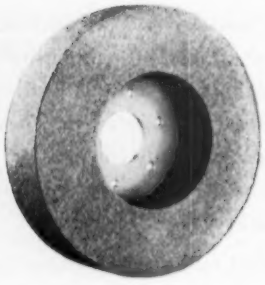
Diamond Chain has long recognized that certain types of internal stressing of chain parts would increase fatigue resistance. To this end, link plates have been specially processed and chain rollers and other parts have been shot-peened since 1944.

DIAMOND **ROLLER CHAINS**

but . . . for carbide tool grinding

SIMONDS WHEELS

cost much *less*



SIMONDS ABRASIVE CO.

Grinding Wheels

Sharpen *your* carbide tools the economical way. Avoid damaging sensitive edges. Prevent shape distortion. Use Simonds' G Electrolon (silicon carbide) grinding wheel. It's the popular "green" wheel . . . less expensive than diamond wheels . . . but a "gem" for safe, cool grinding that prolongs tool usefulness.

Especially efficient for roughing and semi-finishing, these wheels are also frequently used for finishing, too. Made to high standards of accuracy, as are all Simonds Abrasive Company products . . . including grinding wheels, mounted wheels and points, segments and abrasive grain.

Write for your copy of our bulletin (ESA 181) about G Electrolon wheels, including type PM (plate mounted) and tool and cutter shapes—*All* available from stock. Your Simonds Abrasive distributor is equipped to serve you locally. We'll gladly send you his name too.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
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Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

MATERIALS HANDLING

Begins on page 256

RESEARCH

What kinds of handling equipment or improvements can you expect in the future? Here are some of the highlights of what's doing in research on the subject:

- **Radioisotopes for storage batteries.** This is in the realm of "dream stuff" for the present, but experiments show promising results. Radioactive gas instead of a liquid is being used in small batteries for the studies.
- **Explosion-proof lift trucks.** They're being developed for the Armed Forces along several lines. Power may come from compressed air or liquid carbon dioxide, or from a gyroscope. The gyro would be brought up to speed outside the hazardous area. Then the truck mounting it would proceed into the area on gyro power.
- **Spring-loaded wheels for trailers.** They'll improve smooth handling over rough terrain, prevent damage to the load. Some models have already appeared on the market.
- **Railroad car loading.** The problem of bracing loads in railroad cars has been under study for a long time. Now one railroad has built a freight car with a transparent plastic side. Research people will be able to measure the effects of switching, humping, and impact without continually opening the car for inspection. One such car is being used to instruct shippers on proper bracing and loading. The Armed Forces has ordered several of them for its own studies.

AUTOMATION

Although it's pretty much of a novelty outside the automotive industry, automation promises to grow in importance. By combining loading and unloading of machines with processing, you:

- **Reduce handling time.**
- **Cut requirements for machine operators and move-men.**

Turn the page

UNOBA grease keeps rubber ribbons rolling

In this leading rubber plant UNOBA grease lubricates 60-inch ribbon mills under severe conditions of heat and pressure. As these mills roll hot rubber into unending ribbons, there can be no chance of costly breakdowns. That's why reliable lubrication with UNOBA grease is specified.

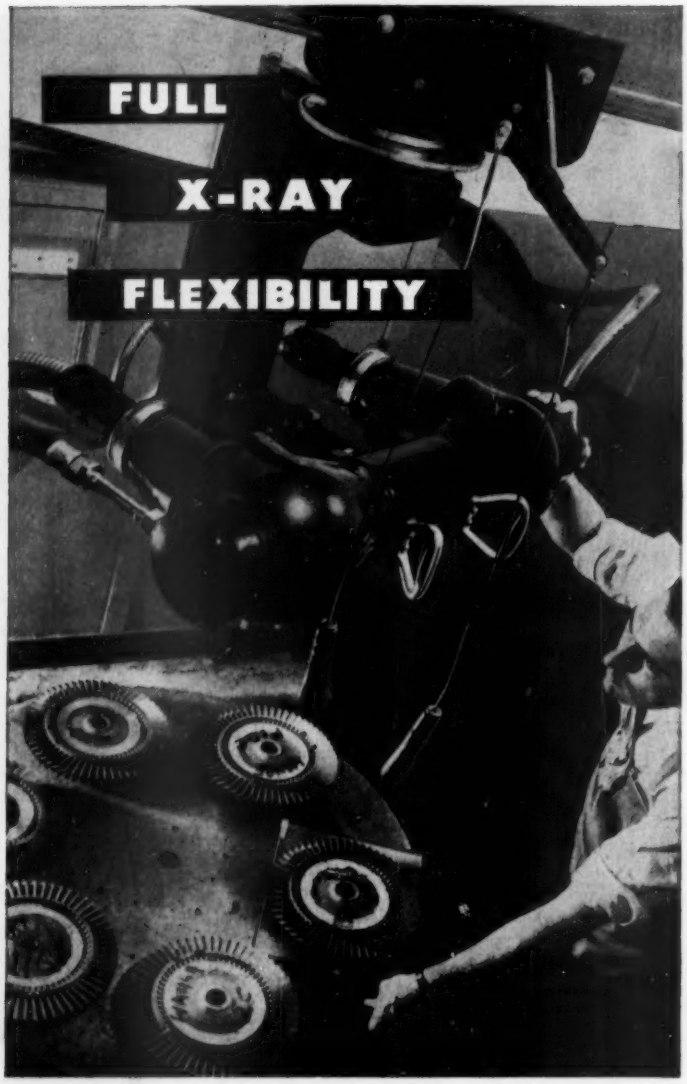
Multi-purpose UNOBA is a *barium* base grease. This makes UNOBA ideal for many unusual operating conditions because it is able to resist *both* heat and water. UNOBA sticks to metal surfaces at temperatures ranging from below freezing to over 300 degrees F., *regardless of moisture!*

Because of its versatility, UNOBA can be used in practically *all* your grease-cup and gun fittings. In some factories, this one grease has replaced as many as seven specialized lubricants. UNOBA will protect against rust, prevent excessive wear and prolong the life of machinery parts.

OFFICES: LOS ANGELES: Union Oil Building • NEW YORK: 45 Rockefeller Plaza • CHICAGO: 1612 Bankers Building
CINCINNATI: 2111 Carew Tower Building • NEW ORLEANS: 917 National Bank of Commerce Building

UNION OIL 76 COMPANY OF CALIFORNIA

Makers of T5X—the amazing purple heavy-duty motor oil.



WESTINGHOUSE 250 KV JIB CRANE X-RAY UNIT

Curtiss-Wright uses Westinghouse X-ray equipment for nondestructive testing of vital parts of their outstanding aircraft engines. Here, they're examining critical welds on gas turbine booster rotors. Prime reason for selection of Westinghouse equipment was *flexibility*—since *flexibility* results in more radiographs per shift.

Kilovoltage on this unit varies from 30 to 250, with greater X-ray output per KV because of constant potential high voltage generator. Result: unit is capable of inspecting materials ranging from 1/8" aluminum to 4" steel.

Jib crane tubestand and X-ray tubehead flexibility allows maximum ease of positioning in radiographing parts of all sizes and shapes. Result: time is saved, output is stepped up.

Call in the Westinghouse X-ray representative, or write Westinghouse Electric Corporation, Industrial X-ray Section, 2519 Wilkens Avenue, Baltimore, Maryland. J-06265

YOU CAN BE SURE...IF IT'S
Westinghouse

MATERIALS HANDLING

Begins on page 256

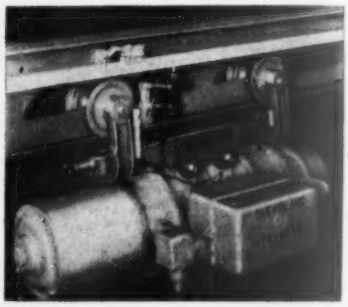
- **Decrease injuries.**
- **Minimize damage to work in process.**

For a study of what you put into and get out of automation, see FACTORY, April 1952, page 85, and December 1952, page 93.

SAFETY

Materials handling manufacturers are constantly trying to make their equipment safer to operate. Last year they:

- **Improved operator-visibility on fork trucks.**
- **Added protective guards to protect operator from injury.**
- **Installed safety switches on cranes.** On one model you can move horizontally only when the load is raised to its highest point.



- **Used safety conductors for tramrails** to protect against accidental contact. There's a plastic cover over the inverted U-shaped bar. Graphite shoe, riding over the bar, provides the power contact.

EDUCATION

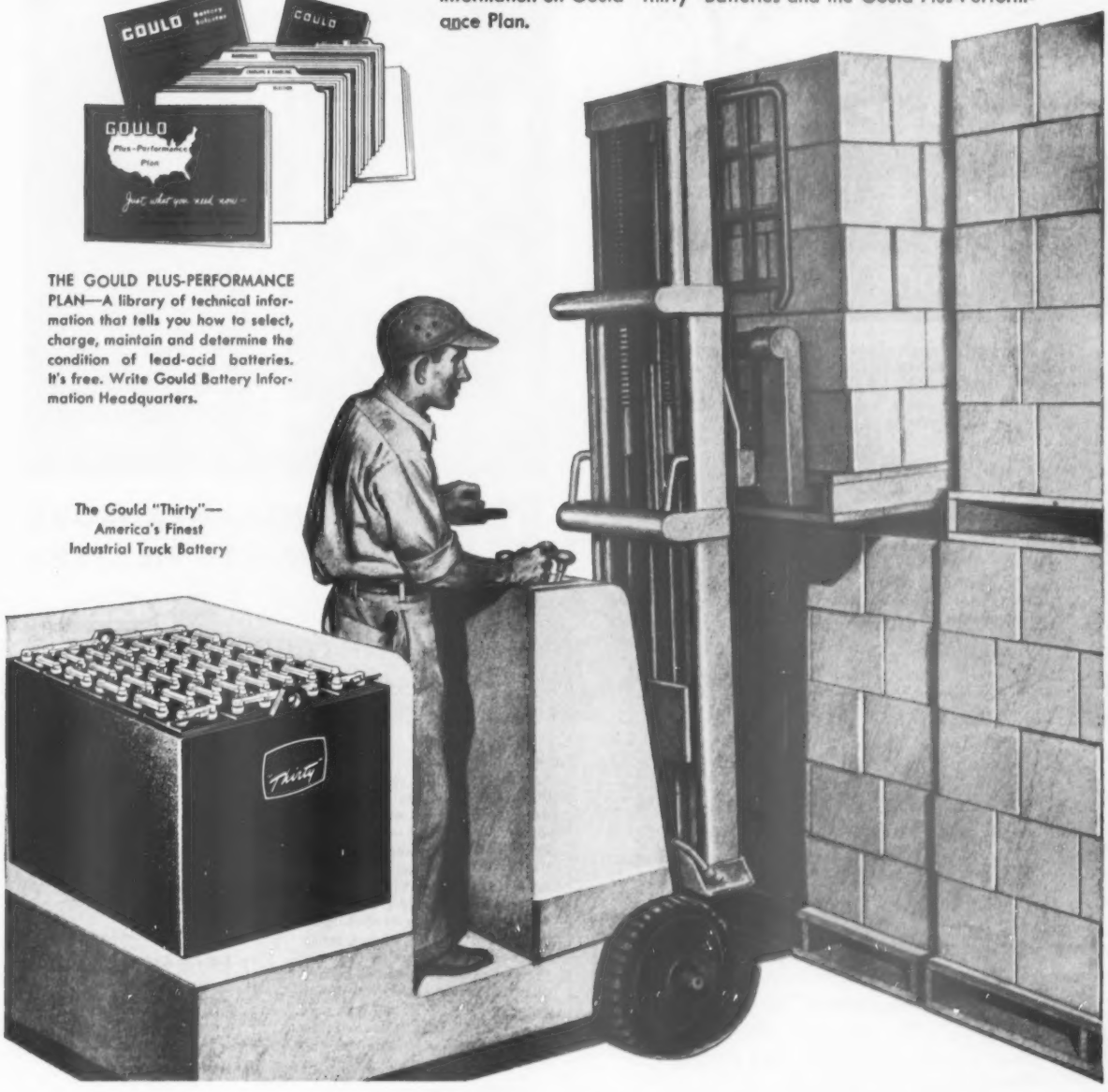
Here's a big field for manufacturers, users, and engineering schools. Within the latter group there's more interest in materials handling as shown by the increase in handling courses. (One university—Wayne University, Detroit — last year began offering a 4-year course leading to a degree in materials handling.) This interest should help produce more young engineers with a better basic grasp of materials handling techniques, according to Material Handling Institute.

HERE'S HOW TO BEAT THE HIGH COST OF MOVING MATERIALS!

For maximum materials handling economy, standardize on Gould "Thirty" Batteries for your electric industrial trucks . . . and systemize battery maintenance with the Gould Plus-Performance Plan described at the left. Here's a sure-fire, cost-cutting combination. Write for full information on Gould "Thirty" Batteries and the Gould Plus-Performance Plan.

THE GOULD PLUS-PERFORMANCE PLAN—A library of technical information that tells you how to select, charge, maintain and determine the condition of lead-acid batteries. It's free. Write Gould Battery Information Headquarters.

The Gould "Thirty"— America's Finest Industrial Truck Battery



GOULD *Industrial Batteries*

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, N. J.

Always Use Gould-National Automobile and Truck Batteries

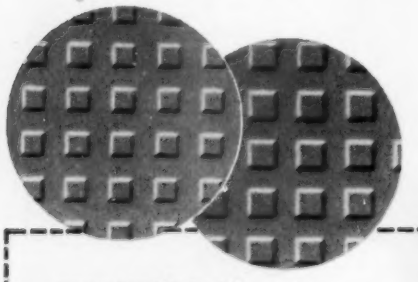
THAT SETTLES IT- WE INSTALL FLOOR PLATES

The safety of your employees and the public is good enough reason to install walking surfaces of slip-resistant J&L Jal-Tread floor plate.

But here are some other important advantages you'll get when you specify Jal-Tread, the only true checker-board floor plate.

- Reduced worker fatigue from feet rocking on uneven surfaces.
- No wheel shimmy in hand industrial trucks.
- Neat appearance . . . easy draining and sweeping in any direction.
- Easy fabrication—square design allows cutting without shearing through raised cleats . . . permits welding joint of uniform thickness.
- Easy cold-forming on standard equipment.

Mail the coupon for more information today. You'll find J&L Jal-Tread will pay off in greater safety . . . lower maintenance costs.

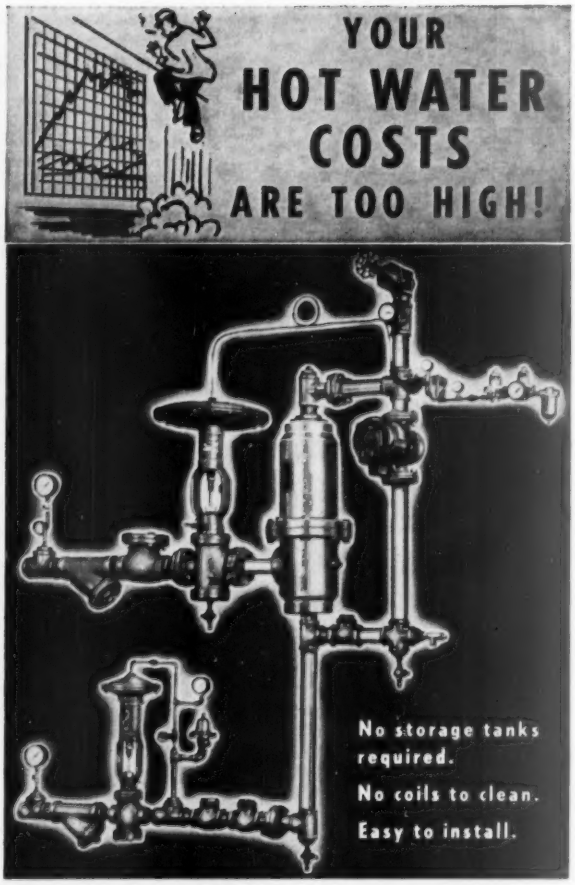


J&L STEEL

Jones & Laughlin Steel Corporation
407 Gateway Center
Pittsburgh 22, Pa.

☐ Please send me your free booklet on J&L Jal-Tread.
☐ Please have your representative call.

Name_____
Company_____
Address_____



Pick INSTANTANEOUS WATER HEATERS

Eliminate

Excessive Fuel Costs!
Unnecessary Maintenance!
Wasted Floor Space!
Fluctuating Temperatures!

Anxious to reduce operating costs? What about hot water — it's a big item? PICK Engineers are ready to help you save money on hot water required for any industrial need — processing, showers, washrooms, lab, truck washing, etc.

PICK Heaters provide hot water INSTANTLY — by quiet steam injection. No waste of heat! They're entirely automatic to provide and accurately maintain temperatures up to 180° F. No storage tanks required. Easily installed in corners, on walls or overhead. Available in seven sizes with rated capacities of 10 to 300 gallons per minute at 140° F. temperature rise. Greater volumes can be obtained with multiple installations.

Write Dept. FM3 for Engineering Details and Specifications

In Daily Use in These Plants:

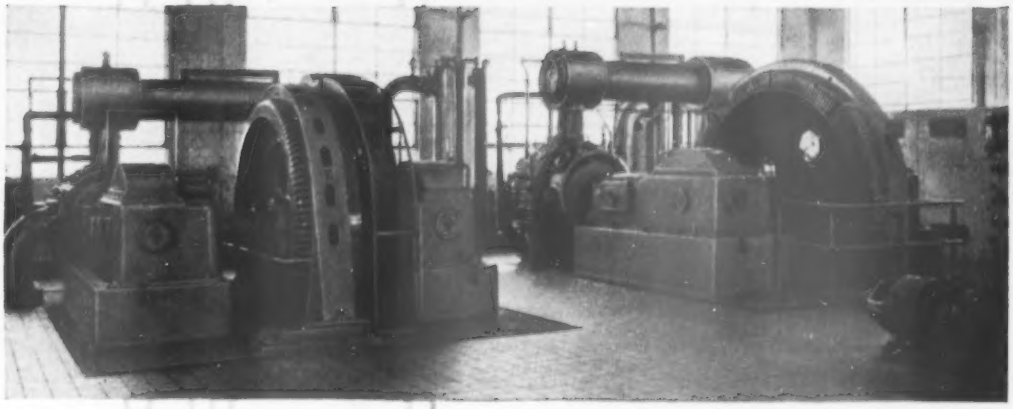
United States Steel Co.
Ford Motor Co.
H. J. Heinz
Bethlehem Steel Corp.
National Dairies
Wilson & Co.

AND MANY OTHERS!

MANUFACTURED BY
PICK MANUFACTURING CO.
WEST BEND, WISCONSIN, U.S.A.

NO CLOCK PUNCHING

for these compressors



That's right! There's no daily time limit placed on the work output of Chicago Pneumatic Class O-CE Compressors . . . they operate "around the clock" with a minimum of attention. Designed for continuous, year-in, year-out heavy industrial usage, these units are unsurpassed for a dependable air power supply at low cost. Built in sizes up to 2,000 hp, for pressures up to 5,000 lbs., they are available in horizontal, two-stage, water-cooled types with direct-mounted synchronous motor drive.

The Chicago Pneumatic Class O-CE Compressor is equipped with roller bearings, Simplate valves for low power consumption, streamlined air passages to cut down air flow resistance, CP Multi-Step Control for partial load economy, and a CP Intercooler for maximum heat transfer and low water consumption. Ask for Bulletin 726. *Chicago Pneumatic Tool Company, 8 East 44th Street, N.Y. 17, N.Y.*

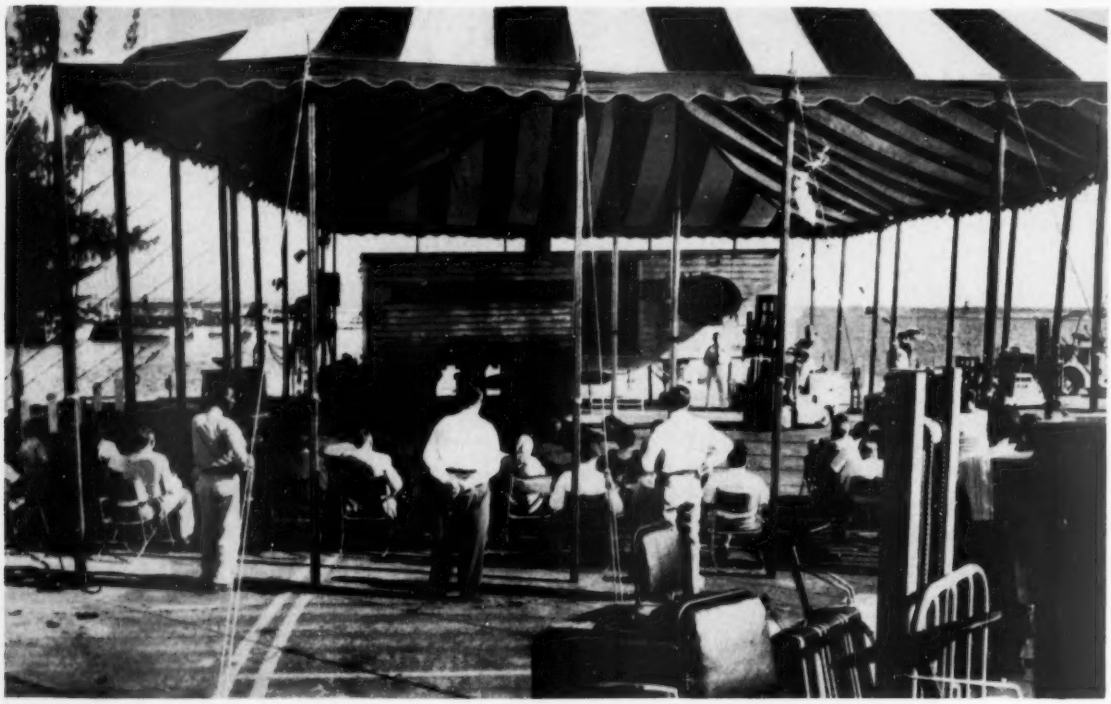
Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

YOU MUSTN'T MISS—

INDUSTRIAL NEWS

INDUSTRIAL NEWS, BEGINNING ON THIS PAGE
TIMELY HINTS TO BETTER MANAGEMENT ON PAGE 292
QUOTES FROM INDUSTRY'S LEADERS ON PAGE 300
IDEAS TO STIMULATE YOUR THINKING, ON EVERY PAGE



WITH BIG-TIME TRAVELING SHOW of handling equipment, Yale & Towne . . .

Takes It Right to the Customer

All good circuses start from Florida. And Yale & Towne's was no exception. It gave its first performance under the canvas on Feb. 24 at Miami. Next day it headed north on the first leg of a 25,000-mile trip that will last two years. A swing through the South will bring it into Philadelphia in good time for the Materials Handling Exposition scheduled for May 18 to 22.

Purpose of the show • According to Elmer F. Twyman, Y&T vice president, it's to "bring modern materials handling experience to thousands of businesses and hundreds of communities that are not yet fully aware of the labor-aiding, cost-saving functions such equipment contributes.

Lack of awareness • "The only thing," he added, "that has retarded the wider application of modern materials handling operations, particularly in smaller plants, has been the lack of awareness . . . of what modern handling equipment could do.

"Through our traveling show, we hope to bring the lesson home, right to the backyard of businesses, big and little, everywhere in the country."

How it works • In each city the local Yale & Towne distributor will cooperate in putting on the

ARO AIR TOOLS

help RYAN *Step up* AIRCRAFT PRODUCTION!

GRINDING . . . Aro Grinder rapidly grinds smooth the weld seam metal on large Ryan-built stainless steel exhaust system for Boeing B-50 bomber.

SCREW-DRIVING . . . Aro Air Screwdriver used to install Phillips screws in windshield frames of Ryan-built refueling pods for huge Boeing KC-97 aerial tankers.

WIRE BRUSHING . . . Aro tool with wire brush removes excess flux and scale from Ryan-built inner exhaust cone for General Electric J-47 jet engine.

Ryan Aeronautical Co. in San Diego, Calif. *speed-lines production* of assemblies for jet engines, bombers, aerial tankers and other aircraft—with the help of ARO Air Tools!

Do you need more speed to cut costs in drilling, grinding, polishing, screw driving and other operations? Perhaps ARO can help you!

An ARO Field Engineer will gladly assist in engineering your job or *contact your ARO distributor.*

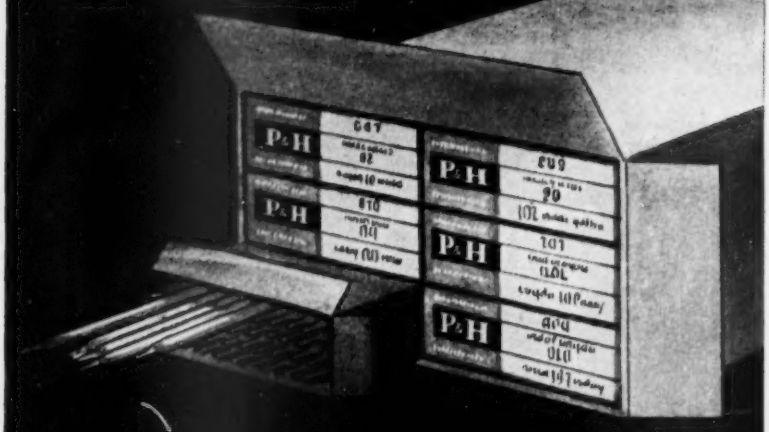
The Aro Equipment Corp., Bryan, Ohio

Aro Equipment of Canada, Ltd., Toronto, Ont.

ARO *The Leader!* **AIR TOOLS**

Also . . . LUBRICATING EQUIPMENT . . . HYDRAULIC EQUIPMENT . . . AIRCRAFT PRODUCTS . . . GREASE FITTINGS

P&H



economical

Handy, small-package assortment of electrodes for repair and maintenance welding

P&H

Maintenance Pack

7 different electrodes
(Approximately 27 lbs.)

- ★ AC-3, 1/8", 5/32", 3/16" — For all position welding of mild steels and sheet metal. AC or DC.
- ★ AC-1, 5/32" — For mild steels. AC or DC.
- ★ 70LA2, 5/32" — For high-carbon, alloy, high-sulfur, free-machining, cold-rolled, and other hard-to-weld steels. Ideal for steel casting repairs. AC or DC.
- ★ Harstain, 1/8" — For spring steels and stainless steels of all kinds. AC or DC.
- ★ Nicast, 1/8" — For machinable welds on cast iron. Nicast welds are strong and non-porous.

$13.90
for complete assortment

Why buy seldom-used electrodes in quantities larger than you need? Now, in one convenient package, you can keep some of each type on hand economically — and get replacement packages as you need them.

The P&H Maintenance Pack equips you to do all kinds of repair and maintenance jobs with the *right* electrode. All rods are packaged to stay dry — and are clearly labeled to make selection easy.

Be ready for emergencies. Save time, trouble, money. Order a P&H Maintenance Pack from your P&H representative or local distributor. If you don't know who he is, write for his name.

P&H WELDING DIVISION
HARNISCHFEGER CORPORATION
4525 West National Ave., Milwaukee 46, Wis.

the P&H *line*

2497

YOU MUSTN'T MISS—

Begins on page 276

three-a-day, 40-min. shows. It takes 7 men to put them on—7 men and two 33-ft. steel-reinforced aluminum trailers, which carry the "works." That includes a 68 x 40-ft. canvas canopy, portable furniture, ramps, 110 lightweight chairs, a soft drink cooler, motion picture projector, and public address system. Plus six fork trucks, assorted fork truck attachments, and half a dozen hoists.

Circus flavor · Although the show is designed to demonstrate Y&T equipment, there is a circus flavor to the "acts." To show the exceptional maneuverability of a 3000-lb. truck, Newcombe C. Baker, Jr., show manager, borrows a dime from someone in the audience, chucks it on the ground, and spins the big truck around it.

When an electric truck makes its entrance, it comes zipping into the ring at top speed. Without warning the driver leaps to the ground. And the truck instantly comes to a full stop. This is a spectacular demonstration of a safety feature of all Yale electric trucks. The seat automatically rises when the operator leaves, thereby cutting off all power and applying the brakes.

Attachments · They get in the spotlight, too—like the clamp gentle enough to handle cartons of TV tubes, yet strong enough to crush a load of bricks; or the side shifter; or the Lift-O-Matic that handles all sizes and types of drums. The OCM catalytic muffler which converts carbon monoxide into harmless carbon dioxide also takes a bow.

When you can see it · The complete itinerary has not yet been announced. Ask your local distributor when the circus is due to hit your plant's neighborhood.

Turn the page

1. Speeds Up Delivery
2. Makes Buying Easier
3. Cuts Purchasing Costs
4. Lowers Your Inventory
5. Ever-Ready Helps on Problems
6. Double Assurance of Satisfaction

You save money when you

Buy through Distributors!

The *way you buy* can slice costs and insure greater convenience . . . that's why it pays to *Buy through Distributors!*

It saves transportation costs . . . cuts down on costly paper work by centralizing your buying in fewer sources . . . holds down costly inventories . . . offers immediate price and catalog information . . . insures faster service on adjustments and complaints . . . gives you superior credit facilities.

Save time and money with Black & Decker Tools . . . sold through leading distributors everywhere! These world-famous tools give you dependable, full-powered motors . . . perfect balance and streamlined design . . . tough, longer-wearing parts for years of top-notch service!

THE BLACK & DECKER MFG. CO.,
Dept. 602, Towson 4, Md.

COMPLETE PROTECTION AGAINST
ATHLETE'S FOOT
at moderate cost!

IMPROVED ALTA-CO POWDER

Refinements and improvements in essential ingredients and production methods make Dolge's famed ALTA-CO more quickly soluble, more agreeable generally and better to handle. Dissolved economically in water for the all-important foot bath, ALTA-CO kills in less than a minute all different species of fungi commonly found in Athlete's Foot. Non-irritating; harmless to towels.

ALTA-CO FOOT POWDER

For dusting feet after shower or other exposure to moisture.

H. D. FUNGICIDE FLOOR WASH

Diluted 1 to 300 in water, this powerful wash provides additional protection against Athlete's Foot on surfaces where fungi are commonly found.

Ask your DOLGE SERVICE MAN about money-saving offer on the DOLGE FOOT TUB.

FOR
FREE SANITARY SURVEY
OF YOUR PREMISES
SEE YOUR DOLGE SERVICE MAN

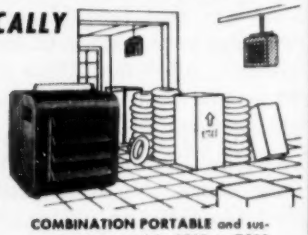
dependable
DOLGE
WESTPORT, CONNECTICUT

COLD SPOTS
Converted TO AREAS OF
PRODUCTION-COMFORT
with
ELECTROMODE
All-Electric UNIT HEATERS

SUSPENSION TYPE MODELS available from 10 to 45,000 watts. Model 14-10 illustrated.

QUICKLY — EASILY — ECONOMICALLY

- Locate wherever heat is needed.
- No piping, flues or fuel storage required.
- Install and heat within one day.
- All current entering unit is converted into heat. No fuel loss en route.
- Models from 1500 to 45,000 watts to fit any heating need.



COMBINATION PORTABLE and suspension type models, 1500 to 7500 watts. Model AN-30A illustrated.

EXPLOSION-PROOF HEATERS for heating hazardous areas subject to explosion. In three sizes: 2000, 4000, 6000 watts. Model CX-2 illustrated.

Completely SAFE! Only Electromode has the cast-aluminum, sealed-in heating element and built-in safety switch. No danger of fire, shock or burn. No over-heating.

Approved by Underwriters' Laboratories

For complete information write:

ELECTROMODE CORPORATION
45 CROUCH ST. ROCHESTER 3, N. Y.

Leader in electric heaters since 1929

YOU MUSTN'T MISS—

Begins on page 276

Every Stroke Counts on Double-End Press

Basic re-thinking is responsible for the design of a new reciprocating hydraulic press now speeding production of 90 mm. shell cases.

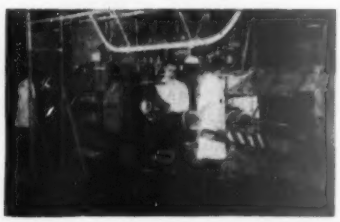
The unusually long return stroke in drawing a shell to 24 inches is lost operating time on a conventional press. So Rheem Mfg. Co., looking for a good way to cut costs in its New Orleans operation, ended up with a double-end horizontal hydraulic press that produces on both directions of the stroke.

How it works · It's just like having two presses in one. During the cupping operation on one end of the press, the other end is loaded for the first draw on the return stroke. After similarly using both ends of the press for three more drawing and one tapering operation, the shell case has reached its final shape.

Other advantages of the press, according to Rheem:

- Less floor space is required than for two conventional presses.
- Conveyorized materials handling is easily adapted to it.
- Installation requires no foundation pits, even where subsoil conditions are unstable.
- Maintenance is simplified and power consumption is reduced.

Clearing Press Corp., Chicago, designed and built the press.



RAMS on opposite ends of horizontal press work alternately to deep-draw 24-in. shells.

Turn the page

BENJAMIN

Only "Magna-Flo" brings you this

exclusive combination !

1 *the latest advancement for*

highest lighting efficiency

...T12 SLIMLINE LAMPS*

*These instant-start, single-pin lamps have a higher light output than other fluorescent lamps—as much higher as 10% or more lumens per watt! "Magna-Flo" units are specifically designed to get maximum efficiency out of these lamps. Shallow socket design of exclusive "Springlox" lampholder assures maximum light output through minimum blocking of light.

2 *the latest advancement for*

lowest maintenance costs

..."SPRINGLOX" LAMPHOLDERS

"SPRINGLOX"
cuts maintenance costs two ways.

- **speeds maintenance**
- **prolongs lamp life**

Benjamin "Magna-Flo" Systems are Sold Exclusively through Electrical Distributors

R-5751B

You get the maximum lighting efficiency out of the T12 lamp *PLUS* all the maintenance advancements of "Springlox" lampholders . . . that's the *exclusive combination* of Benjamin "Magna-Flo"! Only with "Magna-Flo" can you get *BOTH* in one unit . . . and you get both at *no extra cost!*

Send for FREE "Magna-Flo" bulletin; contains complete data on this high efficiency unit with the *exclusive Benjamin Combination!*
Benjamin Electric Mfg. Co., Dept. N, Des Plaines, Illinois.

"Springlox" lampholders are standard equipment with all "Magna-Flo" units, which are available in open or closed-end reflector styles; for 2 or 3 lamps; 48", 72" or 96" long; in individual units or continuous lines.

with THE MULTI-CLEAN METHOD!"

"Keeping our floors sealed with Multi-Clean Concrete Preserver holds dust to a minimum throughout the plant and makes them easier to keep clean and sanitary," says the floor maintenance director of Griggs, Cooper and Company, large mid-western food processing firm.

"Daily sweeping time has been cut at least one-third because heavier dirt doesn't stick to the hard, smooth finish, and dust sweeps up easily. Moisture, too, is prevented from penetrating the floor surface, and makes it impervious to alkalies, grease, acids, etc.

"In our spice and baking powder rooms, dust is extremely fine and hard to sweep up. Here we use the Multi-Clean industrial vacuum which gives us an efficient and dust-free operation.

"We wet mop all our concrete floors once or twice a week and buff them once a month with a fine steel wool disc under a Multi-Clean floor machine to loosen any stubborn dirt and restore the finish. Multi-Clean Concrete Preserver is applied every 6 months to a year, depending on traffic conditions.

"With the Multi-Clean Method of floor care, our concrete floors are kept in better condition to stand the rigorous traffic they get every day. Then, too, they're always clean and attractive, and repairs and replacements are practically non-existent."

Multi-Clean Concrete Preserver

Multi-Clean Floor Machine

Multi-Clean Wet-Dry Vacuum

Every Multi-Clean product carries a 100% guarantee.

MULTI-CLEAN®
PRODUCTS, INC.

free! FLOOR MANUALS
Each for the proper care of a specific floor. Check the coupon for the manuals of your choice.

MULTI-CLEAN PRODUCTS, INC.
2277 Ford Parkway • Dept. FM-4, St. Paul 1, Minn.
Gentlemen—I would like to know more about the Multi-Clean Method for my floors. Send manuals I have checked.

☐ Asphalt Tile ☐ Concrete ☐ Rubber Tile
☐ Wood ☐ Terrazzo ☐ Linoleum
☐ 9-Job Floor Machine ☐ Wet-Dry Vacuum
☐ All-Purpose Scrubber

Name and Title
Company
Address
City Zone State

YOU MUSTN'T MISS—

Begins on page 276

Factory of Future Department

More good news for factory-of-the-future boosters: At least one equipment manufacturer is now building precise, laboratory-type controls with the ruggedness and ease of maintenance required for plant applications.

Perkin-Elmer Corp., Norwalk, Conn., recently unveiled two new infra-red analyzers that can determine just as accurately as lab models how much of a component is present in a solution, regardless of how many other components are present. And the Bichromator and Tri-Non analyzers, by their ability to perform under rigorous operating conditions, make possible continuous analysis for chemical plants.

How they work • The analyzers are electro-optical instruments. They're adjusted to detect infra-red radiation of predetermined wave length, depending on the process component to be analyzed. You place them directly on the process line. When a minute quantity of the process stream flows directly through the analyzer, the concentration of the desired component is instantly and continuously recorded on a chart. Any variation in concentration can be easily compensated for automatically with feedback controls.

The old way • Formerly a plant operator had to send samples of the product to the lab periodically for analysis. This took valuable time to perform. And if results showed process changes were needed, frequently so much time had been lost that the entire batch was unusable.

Availability • They're brand-new. So none are in use at the moment. Both Du Pont and American Cyanamid have them on order.

Turn the page

For Maximum Branch Circuit Protection

INSTALL FA NQP QUICKLAG P *Circuit Breaker* PANELBOARDS

THE LATEST FA contribution to more flexible and efficient branch circuit protection . . . panelboards that are not only safe, dependable, long-lasting and trouble-free but have the added advantage of providing adequately for today's electrical needs as well as future requirements.

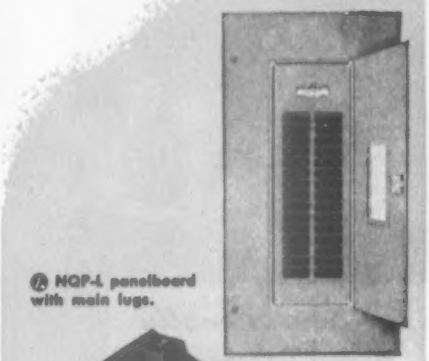
Small and compact, these new and improved panelboards feature the new FA QP Quicklag P Circuit Breaker with thermal magnetic overload protection and manual or automatic quick-make and quick-break operation.

FA NQP Quicklag P panelboards are available in eleven sizes of enclosures — six with main lug connection and five for main circuit breaker connection, 50 — 225 amp capacity. These, plus a stock of individually packed single and double pole FA QP Quicklag P circuit breakers will fit any job requirement. Because all circuit breakers are interchangeable, it is easy as replacing a light bulb to make changes or add new units.

Install these panelboards on all your branch circuits. You'll find that they will virtually pay for themselves in efficiency and service. For additional information, contact your nearest FA representative, listed in Sweet's or your contractor or wholesaler.

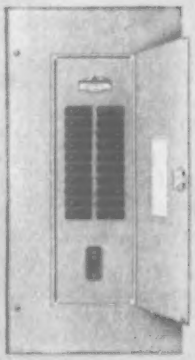
FA NQP QUICKLAG P FEATURES

1) Quick-make and quick-break operation manually or automatically on harmless overloads, short circuits or severe overloads. Handle position indicates "tripped."
2) Quick restoration of service simply by moving handle to "off" and then to "on" position.
3) Screwless assembly (*just slip breakers in*) with one pressure type connection between circuit breaker and bus bar.
4) "Sequence bussing" to balance the load and permit double pole, individual trip combinations.
5) Boxes only 14" wide with 4" gutters.



FA NQP-L panelboard with main lugs.

FA QP Quicklag P Circuit Breaker.



FA NQP-AB panelboard with main circuit breaker.

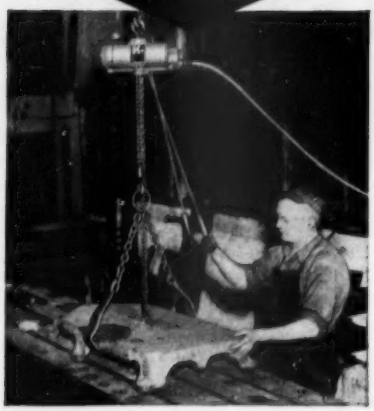
CAPACITIES: 15, 20, 30, 40 and 50 amps; 120 volts, single pole or 120/208 volts, double pole, individual trip; 4 to 42 poles; 120/240 volts, 3 wire single phase or 120/208 volts; 4 wire three phase mains with lugs only or main circuit breaker.

Frank Adam Electric Co.

P. O. BOX 357 ST. LOUIS 3, MISSOURI

Makers of: BUSDUCT • PANELBOARDS • SWITCHBOARDS • SERVICE EQUIPMENT • SAFETY SWITCHES • LOAD CENTERS • QUIKHETER

RATED FOR
continuous duty



Sensationally Different

KELLER Air Hoist

with positive displacement piston-type air motors

Keller Air Hoists can be used continuously over periods of hours (or days) without danger of shortening motor life.

DUST, FUMES cannot injure an air motor. Nor will it burn out, even if stalled all day long.

LOW MAINTENANCE because of simple design. Only a few working parts, and these are fully enclosed. Two grease fittings lubricate all working parts.

VARIABLE SPEED from 0 to 17 fpm permits safe handling of fragile loads. The load hook can be "inched" up or down for accurate spotting.

LIGHTWEIGHT—A 1,000-lb capacity hoist weighs only 30 lb—easy to carry up or down a ladder, and move from job to job.

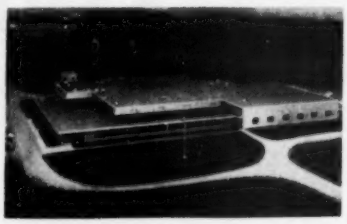
SEND FOR DETAILED INFORMATION

KELLER
Pneumatic Tools

KELLER TOOL CO., GRAND HAVEN, MICH.

YOU MUSTN'T MISS—

Begins on page 276



UP FROM THE ASHES, new plant is built to cut production costs.

Old Plant Burned Out, New One Takes Over

Here's the happy sequel to the story of the company whose plant burned to the ground and only 38 days later was producing again in makeshift buildings (FACTORY, October 1951, page 100). It was March 1951 when the half-million-dollar blaze hit Charles D. Briddell Co., Crisfield, Md.

Recently the company moved into its brand-new cutlery manufacturing plant. It's air conditioned and soundproof, and covers 60,000 square ft. Cost: about $750,000.

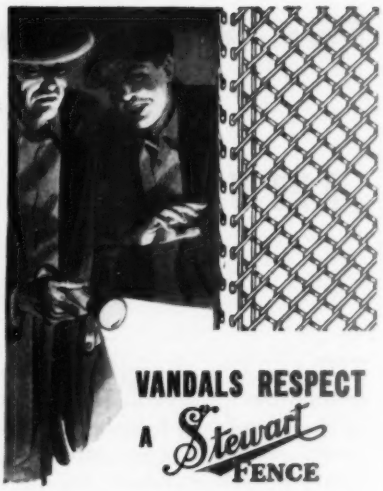
Production up • Machinery has taken over almost every former hand operation. The company's 300 employees have boosted production to 12,000 steak knives a day. According to Willis Briddell, financial vice president:

"We have better layout, better flow of materials, better everything. Lower unit costs may yet convert our disaster into dollars."

Industry Helps Cure Alcoholics

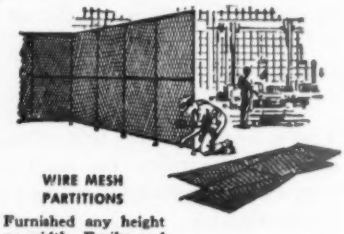
At least one company has done something about curing employee alcoholism—and reports some impressive results.

After a year's treatment, 41 of 51 alcoholics employed by Consolidated Edison Co., New York, have their drinking problem un-



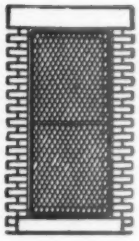
VANDALS RESPECT A Stewart FENCE

Every foot of unfenced property lines, every unprotected door, every window within reach of the ground, and skylights, too . . . all are potential points of entry. So why risk a visit from vandals or saboteurs? Surround your property with a Stewart Chain Link Wire Fence, and install the other Stewart products, some of which are illustrated below, designed specifically for protection against unwarranted trespass. Taking these precautions may prove the best investment you ever made. Write for catalog No. 85.



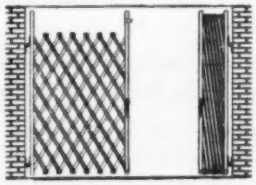
WIRE MESH PARTITIONS

Furnished any height or width. Easily and quickly erected. When writing for prices, please give all measurements involved.



WINDOW GUARDS (Wire or Iron)

Made with round or channel frames to fit any size or shape opening. When requesting prices, please give measurements and send diagrammatic sketch.



STEEL FOLDING GATES

Made in single or double gate construction to fit any width opening. Prices on request. Please give width and height of opening.

THE STEWART IRON WORKS CO., INC.
2056 Stewart Block Cincinnati 1, Ohio
Experts in Metal Fabrications Since 1886

Stewart IRON and WIRE FENCES

ABOVE: Vital to the high production maintained by Gunnison Homes, Inc. is this 650-ton hydraulic press used to bond plywood panels into strong, durable wall sections.
LEFT: Handsome, precision built homes, like the Gunnison Coronado pictured here, are built in a matter of hours.

Answers a pressing need for Gunnison Homes, Inc. . . .

● Gunnison Homes, Inc., situated in New Albany, Indiana, is one of the leaders in the field of manufactured homes. Key to continuous production of precision built homes at the New Albany plant is the 650-ton hydraulic press, shown above, which was installed in 1947. This press processes ten plywood panels every cycle by the combination of heat and pressure . . . a tough job and one requiring reliable hydraulic performance to maintain production schedules.

STANOIL Industrial Oil was installed in the press when it was put into operation six years ago. STANOIL has stood the test of severe operation . . . with no evidence of oil deterioration being found during a recent inspection of the hydraulic system. Operation has been efficient. Minimum make-up oil has been needed to maintain the oil capacity of 450 gallons.

STANOIL
TRADE MARK
Industrial Oil

Find how STANOIL can benefit you by discussing this multi-purpose oil with a Standard lubrication specialist. You can contact him by phoning your local Standard Oil office. Or, write: Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Ill.

What's YOUR problem?

Ralph E. Murnahan, of Standard Oil's Evansville office, is the lubrication specialist who keeps in constant contact with Gunnison Homes to make certain that there is no interruption of operation due to lubrication difficulties.

He is one of many lubrication specialists who make their headquarters in Standard's offices throughout the Midwest. These men have been specially trained in Standard's Lubrication Engineering Schools and, in addition, have a wealth of on-the-job experience.

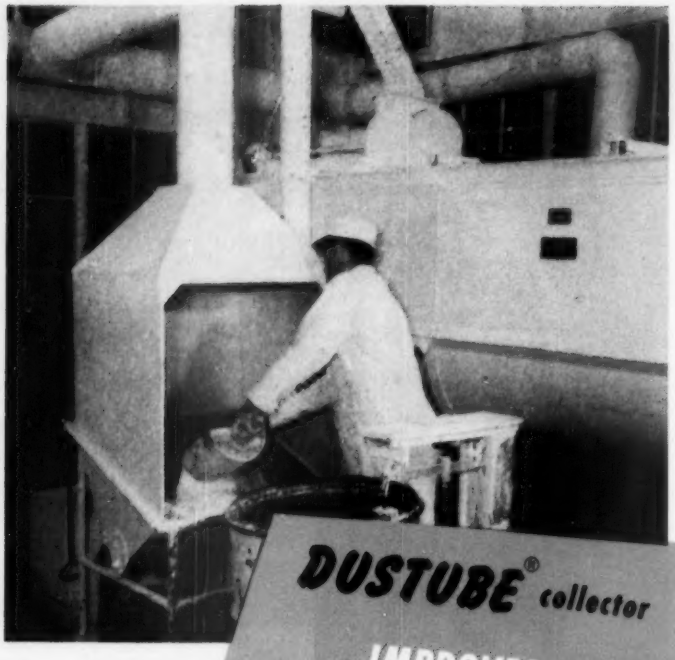
To obtain the service of the lubrication specialist in your area, you need only call your local Standard Oil office. The lubrication specialist will discuss your lubrication problems with you . . . at no obligation to you, of course. He has a complete line of petroleum products to offer you, including:

SUPERLA Greases—Available in a wide range of consistency grades and in both lime-soap and soda-soap types. SUPERLA Greases cover a wide range of operations. These efficient products are comparable in quality with the highest type of special greases.

STANOLITH Greases—Because these unique lithium soap products possess the heat resistant properties of soda-soap greases and the water resistant properties of lime-soap greases, they offer a solution to lubrication problems caused by the presence of both heat and water.

STANDARD OIL COMPANY

STANDARD *(Indiana)*



DUSTUBE® collector
IMPROVES WORKING CONDITIONS
in the manufacture of PHILLIPS' MILK OF MAGNESIA

PROBLEM: The fine pharmaceutical powders used by The Chas. H. Phillips Co., Div. of Sterling Drug, Inc., created a serious dust problem in the tablet making and packaging room operations. The dust laden air settled throughout the room—a source of annoyance to the workers plus increasing plant housekeeping efforts and decreasing efficiency of the necessary air conditioning system.

SOLUTION: A high efficiency Dustube cloth-tube-type dust collector was installed to ventilate all mixing, tableting and packaging operations in processing Milk of Magnesia.

RESULTS: In the words of Mr. R. Ross Kitchen, Plant Manager, "The Dustube Collector has proved satisfactory from the standpoint of improved working conditions, reduced cleaning of department and a definite lengthening of the life of the air-conditioning system. (Time required to clean this unit reduced 75%—man hours from 21 to 5 hours.)" Such outstanding performance is not unusual. It's the kind of efficiency and operating economy that may be expected from Dustube Collectors Get the facts about what they can do on your dust or fume job.

Send today for Bulletin 372 and the address of your nearest Dustube field engineer.

American WHEELABRATOR & EQUIPMENT CORP.
dustube® COLLECTORS
374 S. Byrkit St., Mishawaka, Indiana

YOU MUSTN'T MISS—

Begins on page 276

der control. The remaining 10 cases were failures and the employees have been discharged, retired, or have resigned.

Benefits • According to the Consultation Clinic for Alcoholism, a cooperative venture between several New York hospitals and industries, the cured group has cut its absentee rate from 13.5 to 3.5 days a year. That figure compares with a company average of 6 days a year. In addition, say the clinic specialists, the rehabilitated employees get along better with others, are more stable, and work more efficiently.

Treatment • Patients are on probation while under treatment. They are not hospitalized. Psychiatric treatment, drugs, medical procedures and referral to Alcoholics Anonymous, in some cases, are the methods used.

What's Ahead in College Recruiting

With fewer college graduates available to industry in 1953 than in previous years, your company will have to work extra hard to hire all the promising young people it needs.

Here are some of the ways companies are going about it in 1953. National Industrial Conference Board, New York, surveyed 169 companies for the information:

• **Step up recruitment of college seniors.** 58% of manufacturing companies upped their quotas since 1952. The average company will be trying to recruit 2.3 men per college.

But 90% of manufacturing companies will not hire on the campus. They'll hold off until the student has visited the company.

• **Visit more colleges.** Manufacturing companies will visit an average of 31 colleges in 1953 against 29 in 1952.

Turn the page

SIMPLIFY

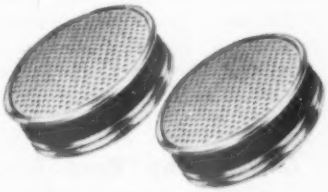
Respiratory Protection

and Inventory with the AO R5000

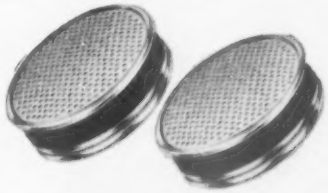
Respiratory Protection

(One Face Mask—Seven Sets of Cartridges Do Work of 7 Respirators)

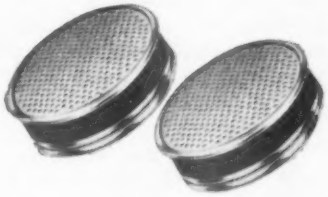
If yours is a multi-respiratory hazard operation, you can streamline the protection problem and the equipment needed to meet it by concentrating on the AO R5000. This twin cartridge respirator converts to many types of protection by interchanging the following cartridges:



R51—For light organic vapors and gases of paint spraying, degreasing, dry cleaning. B. M. 2304.



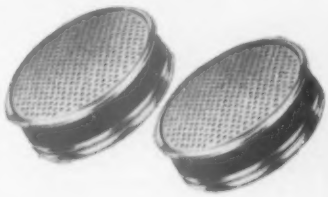
R53—For combined acid and organic gases like carbon tetrachloride and acetic acid.



R52—For acid gases, and mists of plating operations, pickling tanks, etc.

R54—For protection against low or nuisance concentrations of ammonia.

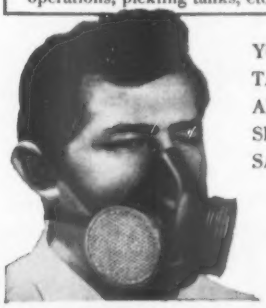
R55—For workers who are exposed both to organic vapors and all dusts. B.M. 2305.



R56—For fumes produced in welding, burning, smelting and refining. B. M. 2163.

R50—For combination of all dusts, toxic, pneumoconiosis-producing, nuisance. B. M. 2156.

AO's Industrial Vision Program Increases Production, Decreases Accidents. Write today for booklet, "Improved Industrial Vision".



AO R5000 RESPIRATOR

YOUR NEAREST AO SAFETY PRODUCTS REPRESENTATIVE CAN SUPPLY YOU WITH THE FACE PIECE AND COMPONENTS REQUIRED TO MEET YOUR SPECIAL NEEDS. HE ALSO SUPPLIES INDUSTRIAL SAFETY GLASSES AND PROTECTIVE CLOTHING.

American Optical

SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

KINNEAR Steel Rolling Doors
answer widest range of door needs

This all-new 1953 catalog gives you full, up-to-the-minute information on how to save maximum space, cut costs, boost efficiency and get more protection at doorways, in old or new buildings. In addition to complete data on Kinnear Steel Rolling Doors — the doors with the famous, *Kinnear-originated* curtain of interlocking steel slats — it tells all about Kinnear Steel Rolling Fire Doors, sectional type Kinnear Wood and All-Steel RoL-TOP Doors, and the protective Kinnear Steel Rolling Grilles. Write for your FREE copy TODAY!

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ROLLING DOORS
Saving Ways in Doorways

1742 Yosemite Ave.
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California

YOU MUSTN'T MISS—

Begins on page 276

• Increase starting salaries. Most companies are figuring on boosting starting pay from 5% to 10%. A bachelor of arts degree is worth between $250 and $350 a month. A beginning engineer can expect from $334 to $375. After a year the former will be making about $340 a month, the latter about $370.

• **Hire below-usual-standard engineers.** Of 70 companies answering the question "What are you doing to meet the current shortage of engineers?" 48 said they would recruit men with some training in engineering for specialized engineering jobs; another 22 companies will accept engineering grads with mediocre grades and consider woman engineering employees. At least one company will recruit abroad.

Getting the "Real Thing" Into Teaching

Here's a good example of how an engineering college can make teaching more meaningful—and attractive—to students: All those enrolled in the motor-design course at Case Institute of Technology, Cleveland, will actually see their classroom motor designs become a reality.

The college has arranged to have the motors built from student specs by Robbins & Meyers, Inc., Springfield, Ohio, without charge. Once completed, the projects will become Case's property. But the students will first have a chance to test the motors and see how good a design job they've done.

The whole idea seems to have caught on, too. This kind of downright practicality in motor construction and power application has attracted twice as many Case students as the "glamor" of electronics.

Turn the page

TO AVOID AIR LINE PROBLEMS

use the HANSEN man's know-how

...backed by experience in hundreds of plants!

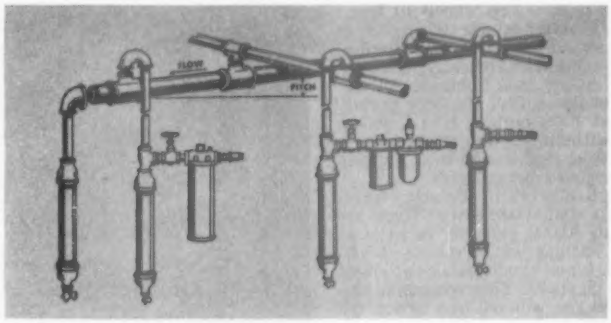
Believe us, you're missing something if you aren't making use of the know-how and help that you can get from the Hansen representative. In dozens of plants, it's almost routine procedure to call him—either when actual troubles arise—or when air line circuits are being planned or altered.

The main job of the Hansen representative, of course, is to supply you with exactly the right couplings for your particular requirements. But from years of on-the-job experience with almost every type of fluid line installation, he can also give you real help on such matters as the pitch of your lines, proper take-off, location of drains and other details which insure a moisture-free circuit operating at maximum efficiency.

THE HANSEN REPRESENTATIVE—

Quick-Connective Couplings Are His Business

BUT SO ARE AIR LINE PROBLEMS



To keep moisture out of air operated devices—

ASK THE HANSEN REPRESENTATIVE ABOUT THE HANSEN HOOK-UP

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LOUISVILLE
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ST. LOUIS
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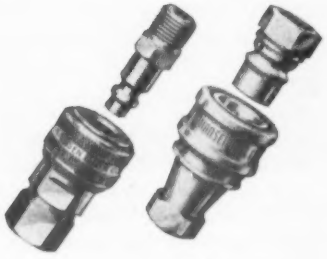
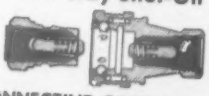


QUICK-CONNECTIVE FLUID LINE COUPLINGS

1. QUICK CONNECTION AND DISCONNECTION **2.** INSTANT AUTOMATIC FLOW OR SHUT-OFF

One-Way Shut-Off

Two-Way Shut-Off



ALSO STRAIGHT-THROUGH QUICK-CONNECTIVE COUPLINGS

Send for Catalog!

THE HANSEN MANUFACTURING COMPANY

4031 WEST 150th STREET • CLEVELAND 11, OHIO

Backstand Belts cut finishing time 70%

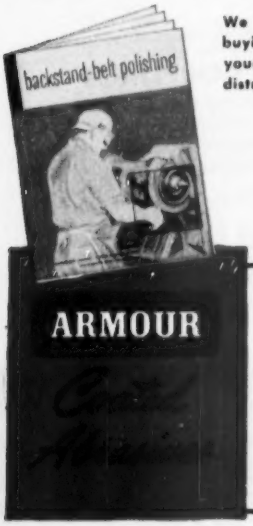
5 minutes on a set-up wheel cut to 1½ minutes with Armour Backstand Belts

Changing from set-up wheels to backstand belts saved 3 minutes 39 seconds in finishing forged paving breaker handles, reports a well-known company*. This operation formerly took 5 minutes 11 seconds. And this wasn't the only saving. Backstand belts outlast 4 to 5 set-up wheels; without dressing they remain flat and true. And due to their uniform grit, they give a better finish.

Belts are only one of the many forms of Armour coated abrasives. There are more than 30,000 different varieties in grit size, backing, etc. We have sheets, disc, rolls, tubes—and specialties to meet your specifications. Your industrial supply distributor will tell you about the Armour line. Call him today!

The complete story of the money-saving backstand belt method is covered in our free booklet offered below. Send the coupon for your copy now!

*Name of company available on request



We recommend buying through your industrial distributor

MAIL THIS COUPON TODAY!

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Please send me your free booklet, "Backstand Belt Polishing."

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Firm .....
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City ..... *Zone* ..... *State* .....

F

YOU MUSTN'T MISS—

Begins on page 276

PRECISION PLASTIC MOLDING is easy to make with . . .

Unique Plastic Injection Press

Here's a low-cost injection press that controls operating pressure and temperature precisely when molding critical plastic parts such as optical components and electrical insulators. It's driven by an air cylinder and develops injection pressures up to 70,000 psi., according to Argonne National Laboratory, Lamont, Ill., which designed it.

Pressure control • The speed of injection is controlled by an adjustable throttle valve. When the air cylinder pressure reaches a preset point near the end of the injection cylinder stroke, there's a sudden increase of pressure to the desired value for injection molding.

Temperature control • The plastic enters the top of the injection chamber. It liquefies while in the upper section of the chamber. As it moves downward toward the mold, it's heated to a higher temperature. And by the time it finally enters the mold, it's at just the right injection temperature.

Cost • Its components cost about $1000. You can assemble and test it in about 250 hours.

Turn the page

New... Mercury YAK 430

Sit down, center control fork truck. 4000 lbs. capacity

Included in the many advanced design features of the new MERCURY "Yak" 430 are...higher maximum fork elevation ★ increased free lift ★ greater speed ★ lighter chassis weight ★ shorter turning radius ★ simple *low pressure* hydraulic hoist system ★ new unit drive with quick detachable motor and self-energizing hydraulic brakes ★ new compensating castor type steering axle ★ Timken duo-grip parking brake actuated by driver's seat. Write for complete details.

MERCURY MANUFACTURING CO.
4110 S. Halsted St., Chicago 9, Ill.

Send copy of new MERCURY "Yak" 430 Bulletin to:

NAME_____

COMPANY_____

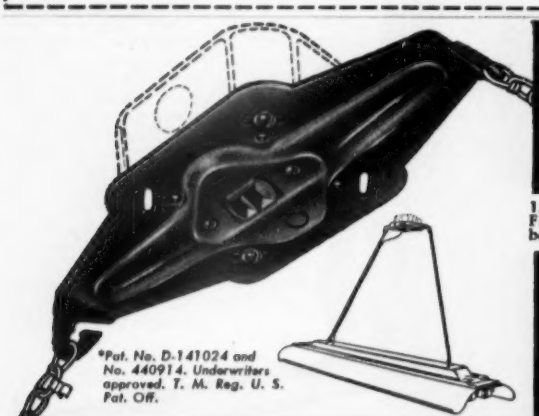
ADDRESS_____

CITY_____ STATE_____

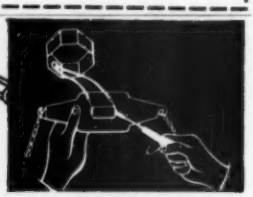
Swell work, Jackson! your shipping dept. really got out the orders last month—that Trojan IMPERIAL Gummed Tape is what you needed!

Call Your Paper Merchant

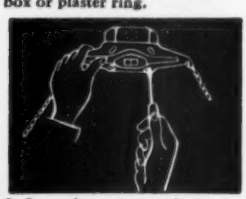
THE GUMMED PRODUCTS COMPANY • TROY, OHIO



*Pat. No. D-141024 and No. 440914. Underwriters approved. T. M. Reg. U. S. Pat. Off.



1. Connect wires to receptacle. Fits standard 4" or 3¼" outlet box or plaster ring.



2. Screw hanger to outlet box—only two screws needed. No centering, punching, or drilling. Screwdriver only tool needed.

3. Hang the fixture and plug it in. That's all! Self-grounding—regular 2-wire cord and plug may be used.

Hydee Hanger: complete with receptacle, two 5-ft. chains, "S" hooks and clips—

AN EASY WAY TO HANG CHAIN-SUSPENDED FIXTURES IN LESS TIME...AT LESS COST...WITH LESS WORK WITH

HYDEE HANGER*

"DECIDEDLY BETTER"
DAY-BRITE
Lighting Fixtures

01

Day-Brite Lighting, Inc., 5441 Bulwer Ave., St. Louis 7, Mo.
In Canada: Amalgamated Elec. Corp., Ltd., Toronto 6, Ontario

DISTRIBUTED NATIONALLY BY LEADING ELECTRICAL WHOLESALERS

YOU MUSTN'T MISS—

Begins on page 276

TIMELY HINTS

Top of Ladder Is Slippery Place

Just because a company is tops in big business today, doesn't mean it's going to be that way tomorrow.

It took 40 years to do it, but more than half the big business leaders of 1909 had dropped to positions of lesser prominence by 1948, according to a recent preliminary report by the Brookings Institution, Washington, D. C.

If size alone isn't assurance of success in industry, what is? The report suggests the answer to that one, too: innovation—the introduction of something new, not merely improved, in materials, products, or manufacturing techniques. Top examples of positions maintained are companies that made drastic innovations.

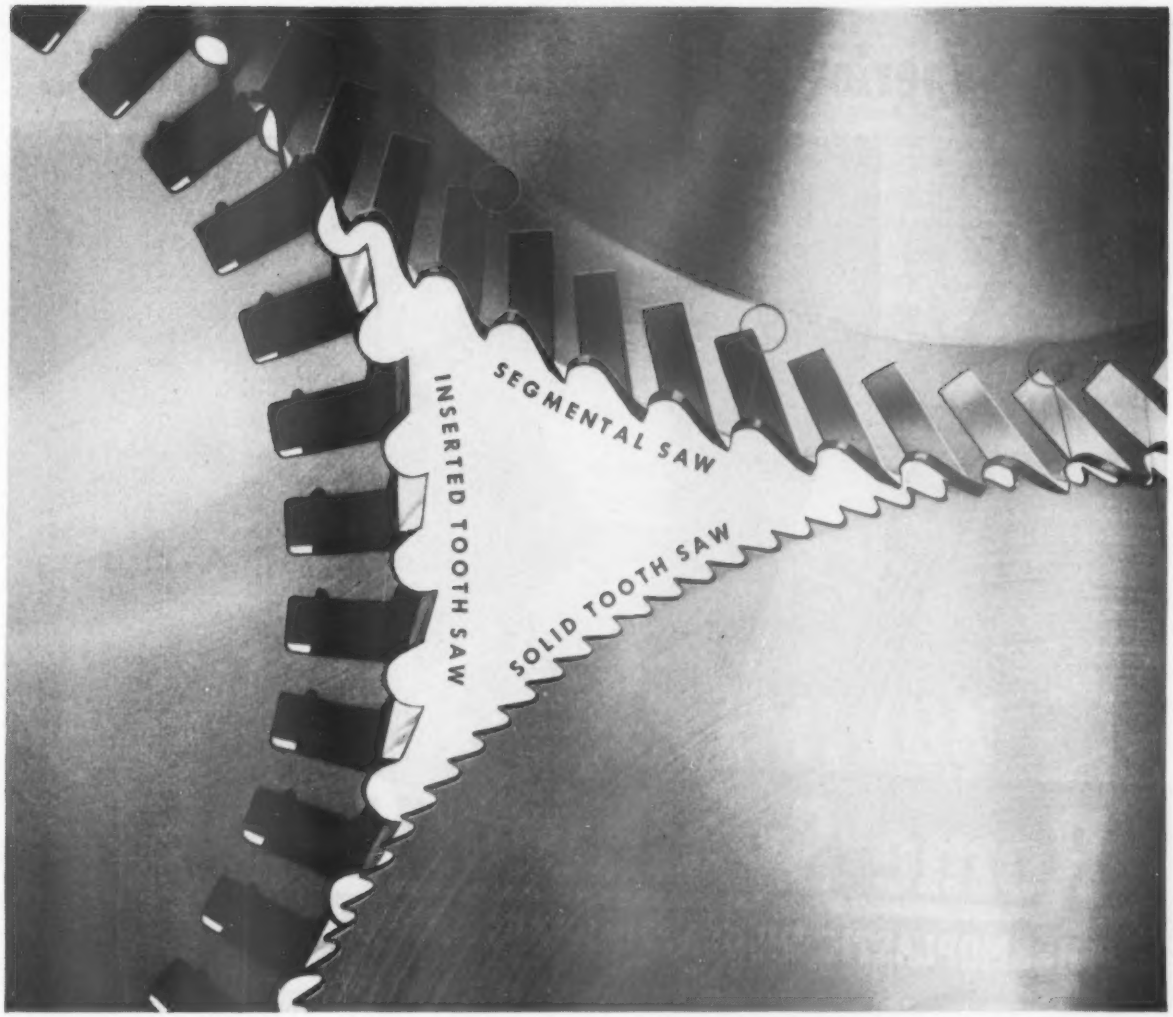
No. 1 Union Target: One Man's Opinion

Higher fringe benefits in the form of health, welfare, and pension funds will be the big union objective this year. Even at the expense of wage increases.

That's the prediction of Richard P. Doherty, former industry member of Wage Stabilization Board.

He feels there's a grave danger of runaway inflation in fringe benefits during 1953. (Last year the hidden payroll amounted to more than 18% of total wages paid.) And it's the smallest companies that have most to worry about, he adds, unless unions recognize differences in management's ability to pay.

Turn the page



"Pick your Teeth!"

For the best saw-performance on your job... SIMONDS gives you a choice of *All 3 Types!*

INSERTED TOOTH: For heavy production cutting of all steel, brass, copper, and aluminum. Alternating square and beveled teeth, "tri-vide" chips for easy cutting and clearance. Teeth can be easily replaced, singly or in complete sets, in your own plant by any average mechanic.

SOLID TOOTH: For general shop cut-off jobs . . . for use on smaller automatic cut-off machines and for cutting jobs where narrow kerf is important.

SEGMENTAL: For especially smooth cuts on production work. High Speed steel toothed segments are securely held in a tough alloy plate by a special tongue and groove design, have quick clearance for faster, freer cutting.

SIMONDS MAKES ALL THREE TYPES OF CIRCULAR METAL-CUTTING SAWS. So you can be sure that SIMONDS will give you *the right saw for your job* . . . for any type of machine. See your Simonds Distributor today, or write the nearest Simonds Office.

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SAW AND STEEL CO.
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Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon. Canadian Factory in Montreal, Que.
Simonds Divisions: Simonds Steel Mill, Lockport, N. Y., Simonds Abrasive Co., Phila., Pa. and Arvida, Que., Canada

Superior Plant Wiring for "Hot Spots"...

Rome Synthinol® 901

THERMOPLASTIC INSULATED WIRES AND CABLES

Whenever your electrically operated equipment is subjected to extreme heat, moisture or corrosive conditions, it will pay you to "wire up" with Rome Synthinol 901 wires and cables. They have proved far superior for equipment wiring as well as for feeders and branch circuits in steel mills, chemical plants, oil refineries and other "hot spots."

A resin plasticized polyvinyl chloride type of insulation, Rome Synthinol 901 provides longer service life under high operating temperctures. It also offers exceptional resistance to moisture, oils, greases and chemicals. Underwriters approved for 600 volts at 90° C. when used as an appliance lead wire.

OTHER ROME SYNTHINOL APPLICATIONS:

Rome Synthinol, Type TW—This small diameter building wire is approved by the Underwriters' Laboratories, Inc. for use in wet locations under the rules of the National Electrical Code.

Rome Synthinol Machine Tool and Control Wire—Adopted as standard wiring by machine tool manufacturers for extreme durability and excellent resistance to oils, acids, alkalies, common cutting solvents and flame. Underwriters' Laboratories approved as Type TW, with end use approval for 80° C. operation in air; 60° C. where exposed to oil and in wet locations. Conforms with National Machine Tool Builders' Association Standards. Send for the Rome Synthinol Bulletin.

It Costs Less to Buy the Best

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Please send me your Rome Synthinol Bulletin.

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Company .....

Address .....

City ..... Zone ..... State .....

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ROME CABLE ROME, N.Y.

YOU MUSTN'T MISS—

Begins on page 276

SHORT-CUT DRAWING (left) saved 5 days over conventional version (right).

How to Save Time in the Drafting Room

We're not interested in fancy drafting techniques or beautifully done but time-consuming layouts. What we want is complete, concise, information. So why should we stick to outmoded drafting techniques?

That, in effect, is the thinking behind General Electric Co.'s adoption of a streamlined drafting program that the company hopes will:

- Save 20 to 50% of drafting time.
- Conserve manpower. With drafting time cut, fewer additional skilled people will be required.
- Save materials. Under the simplified plan, G-E expects to save more than $60,000 annually in drafting paper alone.

How it works · Here's G-E's 2-point program:

1. Eliminate the non-essentials that add nothing to the accuracy, completeness, or clarity of drawings. This means extra views, unnecessary elaboration, repetition, and conventional presentation instead of proper use of standardized symbols.

2. Extend free-hand drawing beyond its present limits. The company says that tests have

Designed for Industrial Service

Applied to Industrial Lighting Problems by Trained Illuminating Engineers

Produced to meet Industrial Performance Standards

Stocked and Sold by Electrical or Industrial Supply Houses

CHAMPION Lamps

four good points...

Lamps bearing the Champion Diamond mark have these four points in their favor. Remember them whenever you buy Incandescent or Fluorescent Lamps for your plant.

FREE FILE ON ENGINEERED LAMP MAINTENANCE

tells you how to determine your most profitable cleaning cycle — how to eliminate 83% of your lamp burnouts — how to cut lamp replacement cost to a sixth of what it used to be. Let us mail you the complete file.

CHAMPION LAMP WORKS
Lynn, Massachusetts
A DIVISION OF CONSOLIDATED ELECTRIC LAMP CO

anchoring problems?

then try

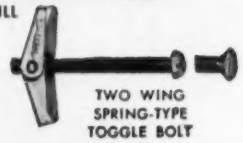
TRADE ARRO MARK

anchoring & fastening devices

More and More, people with anchoring problems are turning to ARRO — the complete line of anchoring and drilling devices for masonry. Remember, there is an ARRO product to meet your specific anchoring requirements.

ARROFLUTE CARBIDE MASONRY DRILL

LAG SCREW EXPANSION SHIELD



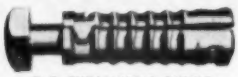
TWO WING SPRING-TYPE TOGGLE BOLT

A-C-E EXPANSION SHIELD

SPRING HEAD STEEL TOGGLE BOLT

DOUBLE EXPANSION SHIELD

RIVETED HEAD TOGGLE BOLT



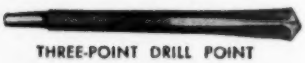
O-E EXPANSION SHIELD

LITTLE MAJOR TURNBUCKLE

MACHINE SCREW ANCHOR

FOUR-POINT HAND STAR DRILL

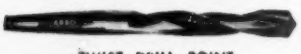
STUD BOLT ANCHOR



THREE-POINT DRILL POINT

FOUR-POINT DRILL POINT

LEAD SCREW ANCHOR



TWIST DRILL POINT

MAL-LEAD BOLT ANCHOR

RUBBERGRIP DRILL POINT HOLDER

See your industrial, hardware or electrical supplier

ARRO EXPANSION BOLT COMPANY

1420 BOONE AVE., MARION, OHIO

YOU MUSTN'T MISS—

Begins on page 276

shown it to be both practical and economical. With all factors made equal, it's said to reduce drafting time by about 20% to 30%.

But G-E is cautioning draftsmen against carrying the streamlining to extremes. Simplified drawing is not a license for careless, sloppy, or indifferent work, the company says.

OVER THE EDGE fall truck and operator. It's a scene from . . .

New Film on Fork Truck Safety

Here's a report from FACTORY's Western Editor, after he previewed a new film on fork truck safety:

" 'Safety Saves' should be seen, in my opinion, by every fork truck operator in industry—trainee or old timer. Its story—how to operate a fork truck safely—is told with a combination of cartoons, on-the-job factory and warehouse shots, and hard-to forget accident scenes.

"Shows how a smart operator observes each safe-driving rule, and what happens to Willie the Cowboy, who doesn't. Bouquets to Clark for eliminating sales effort in this serious film. They used their own trucks, but didn't paint them for the occasion."

Details. The film is black and white, runs 30 minutes. Can be borrowed free or purchased at cost from Clark Equipment Co., Industrial Truck Div., Battle Creek, Mich.

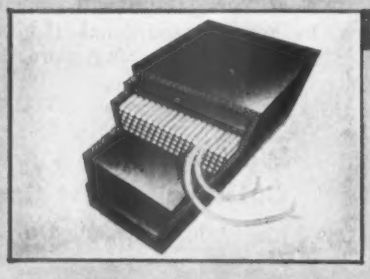
Turn the page

DURKEE ATWOOD V-BELTS

EXTRA VALUES
FOR USERS OF INDUSTRIAL V-BELTS

VERTICAL MATCHING ASSURES EQUAL POWER TRANSMISSION

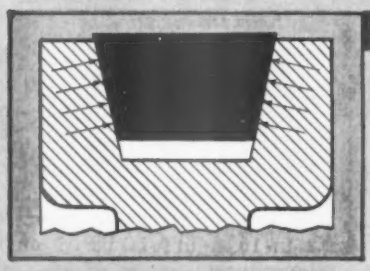
Durkee-Atwood's new vertical V-belt matching machines eliminate the "sag" error always present when V-belts are matched on horizontal matching equipment. Calibration of true running length assures equal power transmission from all belts on multiple belt drives. The machines also test for vibration and possible internal imperfections.



DU PONT CORDURA® RAYON MULTIPLE CORD CONSTRUCTION

High-tenacity Cordura® rayon cords give Durkee-Atwood Industrial V-Belts longer life, less stretch, and greater shock resistance. Use of this revolutionary new cord material is another one of the reasons why D-A Industrial V-Belts are guaranteed to satisfy on any drive.

®Trademark E. I. Du Pont De Nemours & Co., Wilmington, Del.



STRAIGHT SIDEWALLS—FULL GROOVE CONTACT

Durkee-Atwood V-Belts are manufactured with straight sidewalls to maintain full groove contact at all times giving positive drive action. Straight sidewalls reduce slippage and assure smooth, efficient power transmission. The load is distributed evenly over the entire thickness of the belt giving it longer life.

FIELD-TESTED AND APPROVED

Every set of Durkee-Atwood Multiple V-Belts is balanced isodynamically. By running matched sets under full load on special testing equipment, Durkee-Atwood engineers verify their exact equality of load distribution and tension. When you buy Durkee-Atwood Multiple V-Belts you can count on maximum power transmission efficiency . . . pretested to guarantee high-production performance and longer belt life.

New Warehouse Stocks • Chicago, Atlanta, Cleveland, Jersey City

WRITE DEPT. FM-4 TODAY FOR INFORMATION

DURKEE-ATWOOD CO.

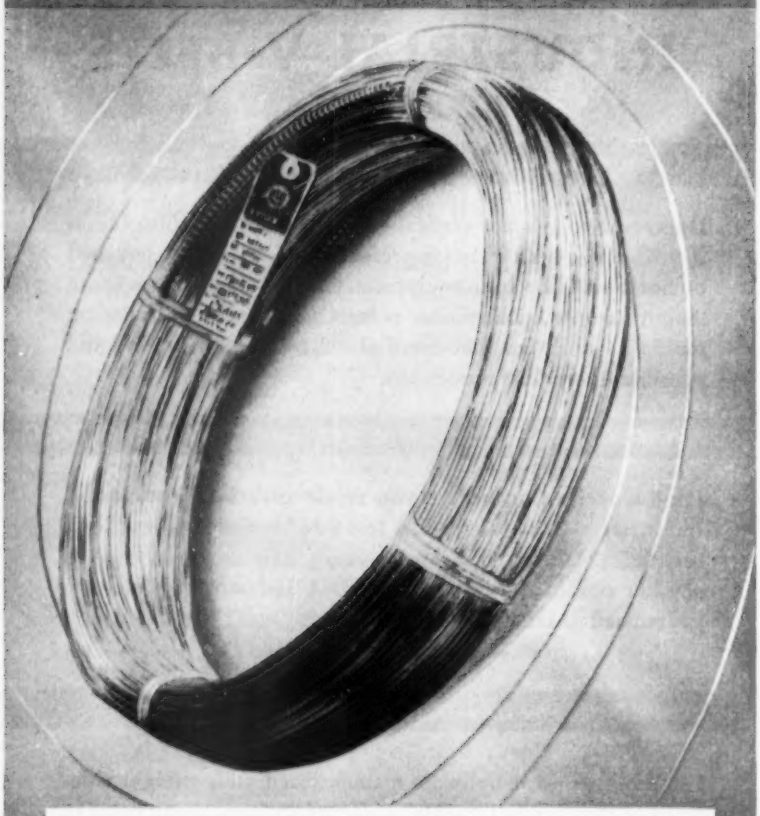
MINNEAPOLIS 13, MINNESOTA

DURKEE ATWOOD

DA PRODUCTS

Form No. 542

JOHNSON



HIGH QUALITY HIGH CARBON WIRES

People want and expect more things than ever before in history—and by special delivery, too.

And that, to a considerable extent, is true of the wire business. The day when any wire would do has long since passed—and that is one of the reasons why JOHNSON MUSIC WIRE is made in more than 200 sizes, all the way from 8.3 feet to over seven miles to the pound. And every order is routed for the fastest possible special delivery.

JOHNSON STEEL AND WIRE COMPANY, INC.
WORCESTER 1, MASS.
New York Philadelphia Cleveland Detroit Akron Chicago
Atlanta Houston Tulsa Los Angeles Toronto

A SUBSIDIARY OF PITTSBURGH STEEL COMPANY

YOU MUSTN'T MISS—

Begins on page 276

Company Publications Are Big Business

Management apparently recognizes the value of company publications as a tool in building public relations, employee morale, and in-plant communications.

Last year companies shelled out about $670-million to publish more than 7000 newspapers and magazines, with a total circulation of about 150-million. And this year, according to Gebbie Press, New York, there will probably be several additional thousand publications reaching more than 10-million additional readers.

Work Sampling Cuts Engine Test Cost

Work sampling applied to aircraft engine testing will help save the Air Force millions of dollars a year with no reduction in quality, the Air Materiel Command announced recently.

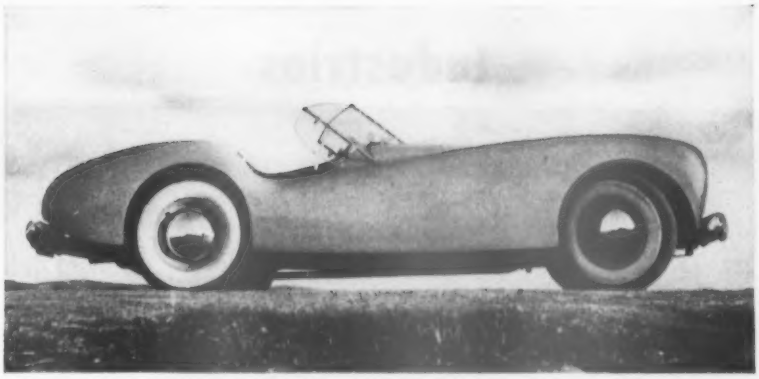
A single Air Force contractor expects to reduce costs half a million dollars a year by strip-testing only 1 aircraft engine out of 10, rather than all of them. The 1-in-10 figure is based on the high "perfection rate" of engines already turned out by the company. The percentage may be higher or lower for other contractors.

Breakdown of savings · 92,000 man-hours in labor; 2.3-million gallons of gasoline for tests; and a reduction in the use of engine test cells and facilities.

If at any time engine quality should be lowered, the plan assures that the contractor will quickly revert to strip-testing larger samples. It may even be necessary to go back to 100% inspection until the quality improves.

Turn the page

"Rates first
for building
the car of the
future" . . .



STANLEY ROUTER

Cleanly, quickly the Stanley Router trims a fender molded from Fiberglas-reinforced plastic. Weighing only 185 pounds and averaging 1/5th of an inch in thickness, plastic car bodies are almost dent-proof, rust-proof, said to be stronger than steel.

"No method can compare with the Stanley R5B Router for speed or accuracy in cutting and trimming our all-plastic car bodies."

That's the report of the Glasspar Company, Santa Ana, Calif.—pioneer manufacturer of light, low-cost plastic bodies that promise major economies in the automobile of the future.

For tomorrow's needs or those of today, you'll find the Stanley R5B Router ready to turn out precision work quickly and economically. This popular portable router has a powerful 1 h.p. motor and the speed to make all kinds of smooth, finished cuts. Use it on wood, plastics, or soft metals. Adapt it to special fixtures, use it with gauges and templates to do an unequalled range of work. Weighs only 10¾ lbs.

Ask your distributor to demonstrate this time and labor saving router—one in the complete line of tough, dependable Stanley Electric Tools. Or write for Catalog No. 96 to: Stanley Electric Tools, 407 Myrtle Street, New Britain, Conn.

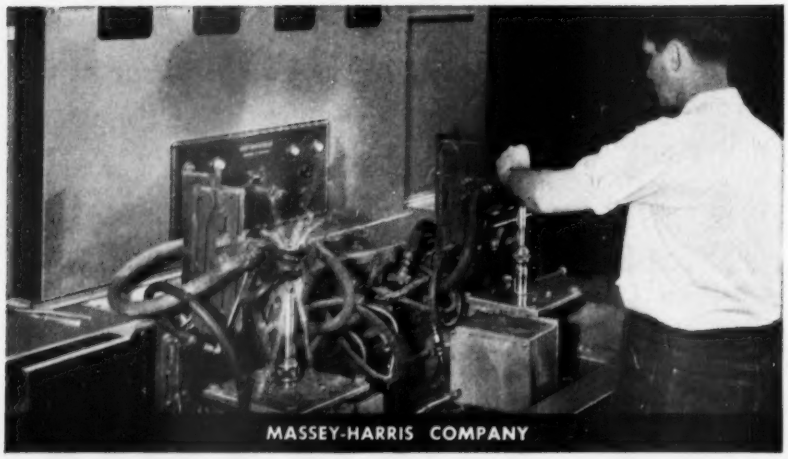
On the job from East to West . . . Made by men who make tools **BEST**

STANLEY
Reg. U.S. Pat. Off.

HARDWARE
TOOLS
ELECTRIC TOOLS
STEEL STRAPPING
STEEL

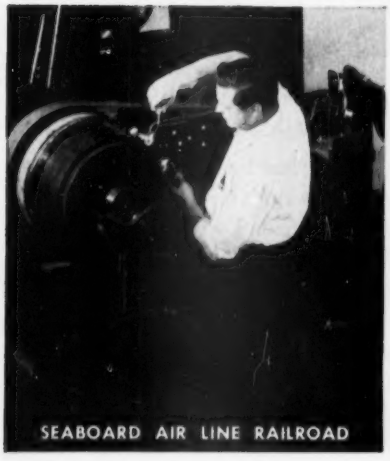
STANLEY *Electric Tools*

Industries

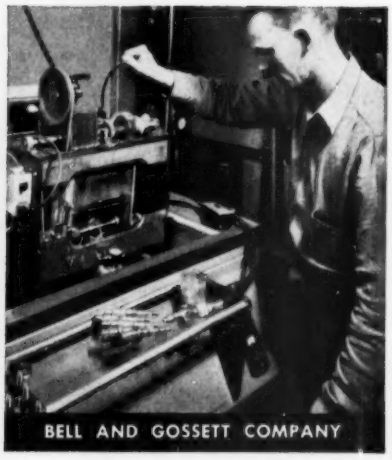


MASSEY-HARRIS COMPANY

across the nation



SEABOARD AIR LINE RAILROAD



BELL AND GOSSETT COMPANY

UP Production with Westinghouse Induction Heating

Production rates upped by 50% to 2000%! Time savings up to 80%! Space savings up to 90%! Figures like these in company after company tell the Westinghouse story. Across the nation, Westinghouse installations are saving time and money—and doing a better job to boot!

What is your heat-treating problem? Hardening? Annealing? Heating? Metal Joining? Westinghouse Induction Heating may be the answer.

For full information write: Westinghouse Electric Corporation, Electronics Division, Department 62-6, 2519 Wilkens Avenue, Baltimore, Maryland.

YOU CAN BE SURE...IF IT'S Westinghouse

J-02262

YOU MUSTN'T MISS—

Begins on page 276

QUOTES

John S. Bugas of Ford Motor Co. describing **what's ahead in productivity:**

If we can do as well in the next 100 years as we have in the past . . . your grandchildren and great grandchildren in 2052 will have a standard of living eight times as high as that we now enjoy.

Fantastic as this seems, our past progress has been just as fantastic.

Dr. L. A. DuBridge of California Institute of Technology pointing up **the importance of research in the industrial structure:**

Whether your company still is in existence and making a profit 10 or 20 years from now, or what kind of a product it will be making or selling then, is more likely to be determined by what happens in the laboratory than in the accounting office or the sales office—or even in the halls of Congress or the White House.

And the management that ignores what goes on (in the laboratory) is ignoring the real things that affect the future.

Lemuel R. Boulware of General Electric explaining **how dissenting members can get along with their unions:**

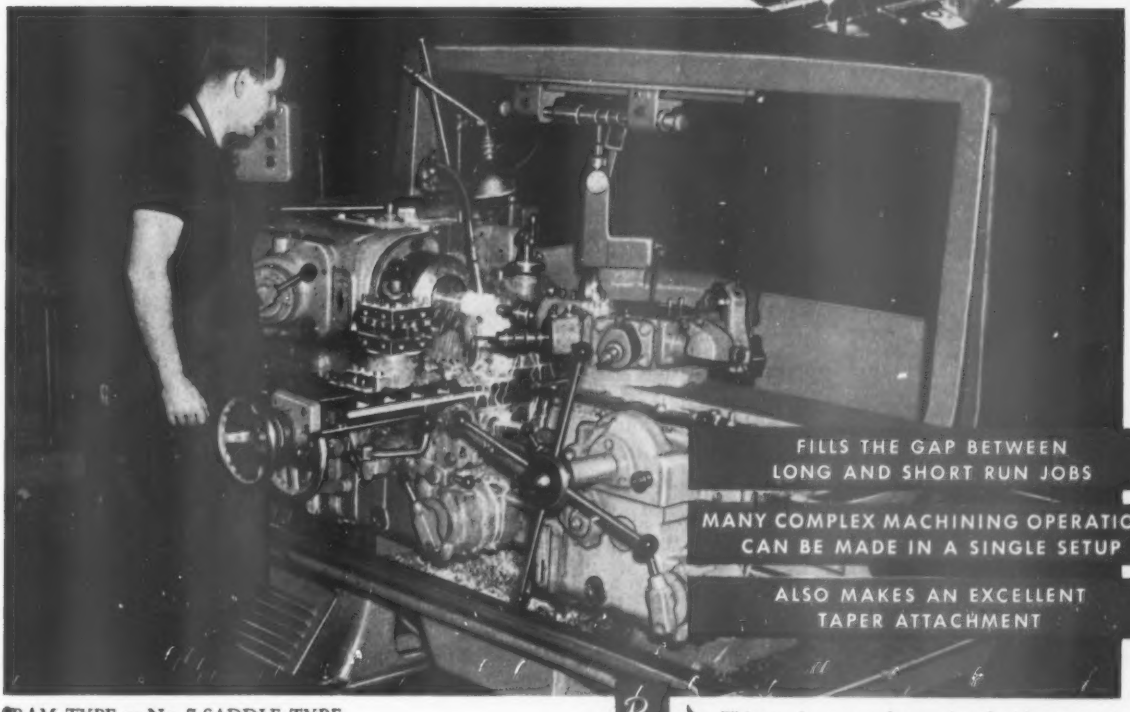
Rather than advocating any "busting" of unions, we believe that any member—who might be in doubt about his union, but who is sincerely devoted to the union idea—should not retire to the sidelines. We think he should stay in the union, take part in union meetings, and get others to do so.

Turn the page

NEW HYDRAULIC TRACING ATTACHMENT

for J&L turret lathes*

Will reduce your costs — direct and indirect — by combining in a single machine all the advantages of TRACING for contour turning, boring or facing operations, with the advantages of multiple tooling and the many other time saving, cost saving features of J & L Universal Turret Lathes.



FILLS THE GAP BETWEEN LONG AND SHORT RUN JOBS

MANY COMPLEX MACHINING OPERATIONS CAN BE MADE IN A SINGLE SETUP

ALSO MAKES AN EXCELLENT TAPER ATTACHMENT

*RAM TYPE or No. 7 SADDLE TYPE

P.S. This attachment can be purchased with new machines or installed in the field on machines now in service. Write for descriptive leaflet giving complete specifications.

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., 505 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

J&L TURRET LATHE DIV.

The stamp of approval which you have placed on Solar's line of original self-closing waste receptacles has been acquired through years of producing quality units.

In every conceivable type of location you will find Solar Self-Closing Waste Receptacles. With its exclusive gravity self-closing top, the Solar Receptacle has become a sanitation "must" in schools, hospitals, food processing plants, factories, municipalities and countless other institutions. It has no springs, weights or hinges to get out of order. The very simplicity of the Solar top is our assurance to you of satisfactory service.

Your premises will be neater, cleaner and safer with Solar Self-Closing Waste Receptacles. Write for additional information.

PSC

SOLAR-STURGES Mfg. Div.,
PRESSED STEEL CAR COMPANY, INC.
Melrose Park, Illinois • AUstin 7-1964

YOU MUSTN'T MISS—

Begins on page 276

David A. Wallace of Chrysler Corp. on **the limits of automation:**

> It is limited by the amount of money you have, in the first place. The next limit is your product.
>
> You have to be sure that in automation you have a long-time product. Otherwise you can't afford the investment.

Peter F. Drucker of New York University maintaining **the great need for executive development:**

> The people who make the decisions today won't be around tomorrow. They are busy bailing out of the decisions of the previous people. That means you must have a commitment to tomorrow's management or else your decisions are baseless. That also means, those people who will have to bail out of the decisions tomorrow—let them be in on [today's] decisions so they know what they are going to have to live with.

John S. Coleman of Burroughs Adding Machine Co. commenting on **human relations in industry:**

> There is no gimmick in human relations, unless it be common sense and goodwill. For the solutions of our problems cannot be found in some blueprint. They must eventually be built up from the little bits of experience of reasonable men everywhere.

Philip Sporn of American Gas & Electric telling about **the need for more engineers:**

> The world can truly say to the engineer: you made me what I am today. [But] the world of tomorrow we are seeking will never come into being without more engineering and more engineers.

Turn the page

What's Screwy? *by Phillips*

"Ed has discovered that Phillips Cross-Recessed-Head Screws are definitely decorative."

PERFECTLY MATED! Only Phillips Drivers are perfectly mated to Phillips Screws. Look for the name Phillips on the shank.

DECORATIVE APPEARANCE is but one of many advantages of Phillips Screws. They cut driving time up to 50%, eliminate driver skids and split screw heads. These screws add structural strength, set up tighter, resist vibration. To save time, work, money insist on Phillips Screws — Wood, Machine, Tapping Screws or "Sems."

PHILLIPS *Cross-Recessed-Head* SCREWS

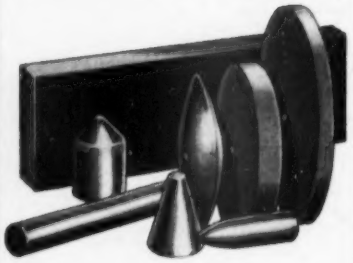
X marks the spot... the mark of extra quality

AMERICAN SCREW COMPANY • ATLANTIC SCREW WORKS, INC. • THE BLAKE & JOHNSON CO.
CENTRAL SCREW COMPANY • CONTINENTAL SCREW COMPANY • THE EAGLE LOCK COMPANY
ELCO TOOL AND SCREW CORPORATION • GREAT LAKES SCREW CORPORATION • THE H. M. HARPER CO.
THE LAMSON & SESSIONS COMPANY • NATIONAL LOCK COMPANY
THE NATIONAL SCREW & MANUFACTURING CO. • PARKER-KALON CORPORATION
PHEOLL MANUFACTURING CO. • ROCKFORD SCREW PRODUCTS CO. • SCOVILL MANUFACTURING CO.
SHAKEPROOF DIV. OF ILLINOIS TOOL WORKS • THE SOUTHINGTON HDWE. MFG. COMPANY
STERLING BOLT COMPANY • STRONGHOLD SCREW PRODUCTS, INC. • WALES-BEECH CORP.

TODAY'S...AND THE FUTURE'S...FINEST FASTENER

Simplify Your
BURRING, SMOOTHING
and POLISHING operations
CRATEX
RUBBERIZED ABRASIVES

"cushioned action performance"



Today's changing manufacturing picture — new production methods, new metals, increased use of plastics, new finishes, the rise in labor and material costs — all of these factors deserve the consideration and use of Cratex Rubberized abrasives for:

BURRING • SMOOTHING • POLISHING
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CRATEX Rubberized Abrasives are made in four "grit-types" from coarse to extra fine —and over 160 standard sizes in—

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Ideal for Machine or Manual application on hard or soft **Metals, Plastics, Glass** and scores of other materials.

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Cratex abrasive engineers will gladly, without charge, analyze your individual production operations and recommend the correct "rubberized abrasives" to lower your production costs and to meet your burring, smoothing and polishing problems. Check the coupon for—"Application Analysis Form."

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Without any obligation please send us—
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STREET
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YOU MUSTN'T MISS—

Begins on page 276

Dr. Charles F. Kettering of General Motors, commenting on **how to achieve success in business:**

An enterprise survives and grows depending on whether it continues to serve its customers. When the executives become so impressed with its position and its past record that they spend more time at the country club and less at their desks serving the customers, that outfit goes on the skids and another takes its place.

Dr. Simon Ramo of Hughes Aircraft illustrating **how technical people regard business executives:**

The scientist and engineer are likely to look on the average business executive as a thoroughly backward character who is against the introduction of any change in his business basically (although he is awfully good at after-dinner speeches which pay tribute to the vision of himself and other members of his organization in adapting themselves to the new.)

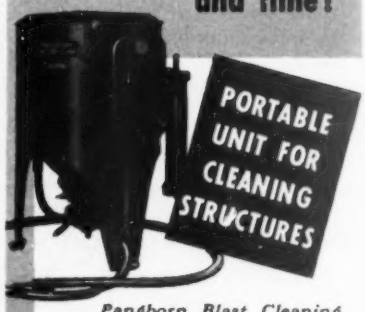
Nevertheless I think all of us have to agree that if we move our secretary's desk ten feet, it takes a number of days to get adjusted to the new situation so that the operation can go on smoothly.

Crawford H. Greenewalt of Du Pont telling **why management is having a hard time attracting top people:**

With the exception of a few glamor jobs, even top executives of vast ability remain relatively unknown outside their own field.

By its very nature, business is largely anonymous—it is a team effort with few featured performers. A bit player on television, a dance-band leader or a third-drawer novelist is far better known than many leaders of industry.

Large or small jobs—
PANGBORN BLAST CLEANING
cuts maintenance cost and time!



Pangborn Blast Cleaning Machine—Cleans tanks, bridges, buildings, and other structures quickly and economically. Ideal for maintenance and other jobs, such as removal of dirt, scale, rust, etc. preparatory to painting. Six sizes, stationary or portable, from . . . **$170** and up.

Pangborn Blast Cabinet—Saves time and money in cleaning small metal parts . . . removing rust, scale, grime, old paint, etc. Produces smooth, clean surfaces on pieces up to 60″ x 35″ in size. Models from . . . **$319** and up.

Pangborn Unit Dust Collectors—Trap dust at the source. Minimize maintenance, allow reclamation of valuable material . . . **$286** and up.

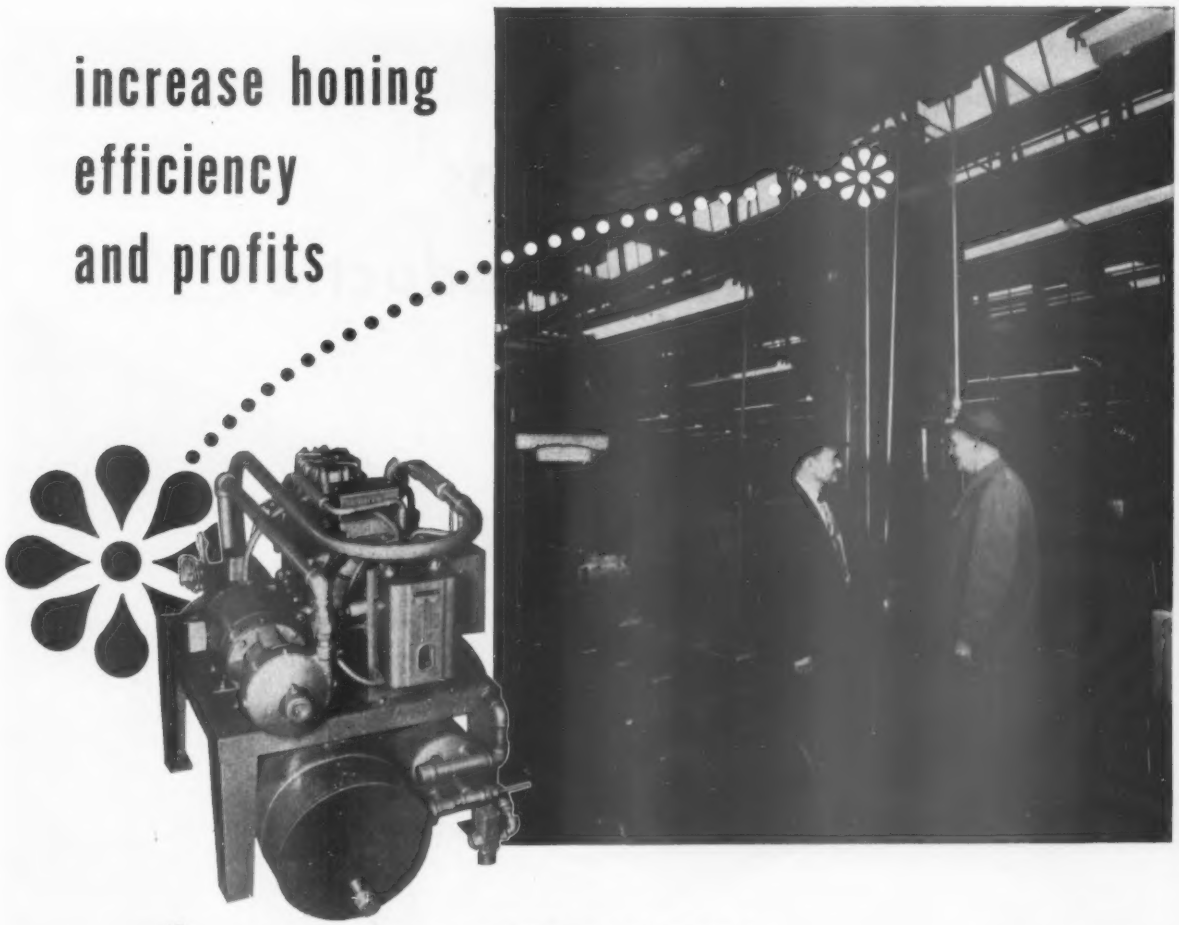
Pangborn Hydro-Finish Cabinets—Remove directional grinding lines, hold tolerances to .0001″. Reduce further finishing of tools, molds, dies . . . **$1410** and up.

Write for details on these machines to: PANGBORN CORPORATION, 2100 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment.

Pangborn
BLAST CLEANS CHEAPER
with the right equipment for every job

increase honing efficiency and profits



with Acme FLOW COLD® Packaged Liquid Chiller

PROBLEM

THE REO MOTOR COMPANY in Lansing, Michigan had two honing machines that were not operating at peak efficiency because the oil used in the coolant process picked up large amounts of heat during the honing operation. The result was low production and a large number of rejects. Extremely limited space made the installation of the usual industrial chilling unit impossible.

PLAN

Acme engineers recommended the installation of a 15-horsepower Flow-Cold Liquid Chiller. This unit with a cooling capacity of 40 gallons per minute in reducing the coolant used from 90 to 70 degrees, met minimum space requirements. Mounting the pump of the chiller on the floor and the liquid chiller overhead allowed the pumps of the honing machine to remain in the same position where they could continue to service the machine when the chilling unit was shut down.

PROFITS

An immediate increase in production capacity and a decrease in the number of rejects was evidenced as the heat was dissipated during the chilling process and the coolant returned to the honing machines at a constant temperature. The compact packaged Flow-Cold serviced the two honing machines with maximum efficiency and performance.

RESULTS

Since this installation was made Reo has added two more Flow-Cold "packaged" units — one for a broaching machine and the other for a quench-bath cooling process.

ACME AIR-CONDITIONING REFRIGERATION

ACME INDUSTRIES, INC. JACKSON, MICHIGAN, U.S.A.

Flow Cold Division

CONTINUOUSLY SERVING THE AIR CONDITIONING AND REFRIGERATION INDUSTRIES SINCE 1919

Sure signs of precision production

Fine tools are the surest sign of expert craftsmanship in any trade. And, for the machinist, none are finer, more reliable than Brown & Sharpe Machinists' Tools. They command a respect and confidence which are reflected in greater accuracy and increased output of your precision products. They are found wherever precision production is paramount.

The complete line of Machinists' Tools is fully described in the Brown & Sharpe Small Tools Catalog. Write Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

Buy through your local Distributor

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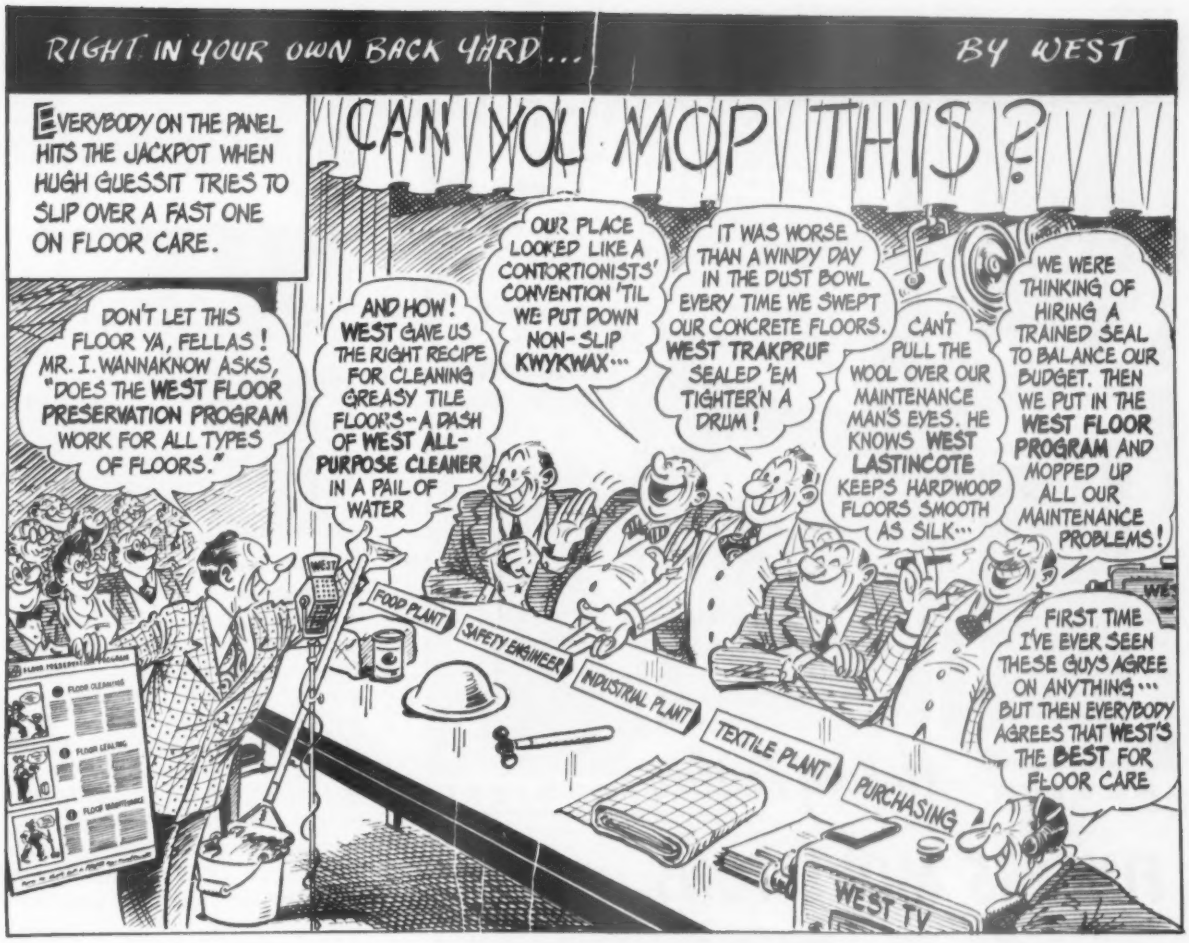
RIGHT IN YOUR OWN BACK YARD...
BY WEST
EVERYBODY ON THE PANEL HITS THE JACKPOT WHEN HUGH GUESSIT TRIES TO SLIP OVER A FAST ONE ON FLOOR CARE.
CAN YOU MOP THIS?
DON'T LET THIS FLOOR YA, FELLAS! MR. I. WANNAKNOW ASKS, "DOES THE WEST FLOOR PRESERVATION PROGRAM WORK FOR ALL TYPES OF FLOORS."
AND HOW! WEST GAVE US THE RIGHT RECIPE FOR CLEANING GREASY TILE FLOORS--A DASH OF WEST ALL-PURPOSE CLEANER IN A PAIL OF WATER
OUR PLACE LOOKED LIKE A CONTORTIONISTS' CONVENTION 'TIL WE PUT DOWN NON-SLIP KWYKWAX...
IT WAS WORSE THAN A WINDY DAY IN THE DUST BOWL EVERY TIME WE SWEPT OUR CONCRETE FLOORS. WEST TRAKPRUF SEALED 'EM TIGHTER'N A DRUM!
CAN'T PULL THE WOOL OVER OUR MAINTENANCE MAN'S EYES. HE KNOWS WEST LASTINCOTE KEEPS HARDWOOD FLOORS SMOOTH AS SILK...
WE WERE THINKING OF HIRING A TRAINED SEAL TO BALANCE OUR BUDGET. THEN WE PUT IN THE WEST FLOOR PROGRAM AND MOPPED UP ALL OUR MAINTENANCE PROBLEMS!
FIRST TIME I'VE EVER SEEN THESE GUYS AGREE ON ANYTHING... BUT THEN EVERYBODY AGREES THAT WEST'S THE BEST FOR FLOOR CARE
FOOD PLANT
SAFETY ENGINEER
INDUSTRIAL PLANT
TEXTILE PLANT
PURCHASING
WEST TV

New floors cost $300,000,000 *a year!*

TYPE OF FLOOR	INSTALLED COST* OF 50,000 SQ. FT.
Asphalt Tile	$15,000
Concrete	18,000
Linoleum	21,000
Hardwood	27,500
Cork	39,000
Rubber Tile	44,000
Vinyl Tile	44,000
Ceramic Tile	65,000
Terrazzo & Mosaic	87,500
Marble	150,000

*Based on reports of reliable flooring contractors in urban areas.

How much will it cost you to replace worn-out floors today? The chart gives you some idea.

But, your floors *don't have* to wear out. They can be protected almost indefinitely.

How? With West's simple, proven FLOOR PRESERVATION PLAN. (1) *Cleaning* — remove all dirt without harming floors (2) *Sealing* — fill the pores. Provide a protective coating (3) *Maintaining* — put on a tough, anti-slip floor wax.

The West Plan offers you more than 20 proven products. A West Floor Specialist will be glad to help you select the program or product you need.

WEST DISINFECTING Company

42-16 West Street, Long Island City 1, N. Y.

Please send FREE booklet "Proper Care of Floors"

DEPT. 56

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

COOLERS for every plant need
The workers' productivity depends as much on comfort in the plant as on methods and machines. One big step forward is the installation of Halsey Taylor Coolers at strategic shop locations to insure a plentiful supply of cool water. The Halsey Taylor line is complete . . . coolers with vitreous china or stainless steel tops, cafeteria models, remote-type coolers . . . and of course, fountains for shop or office.
The Halsey W. Taylor Co., Warren, Ohio
MODERN Halsey Taylor COOLERS

FINGERS MOVE TONS...
INCHES OR FEET WITH THIS FLOOR OPERATED
MAGNETIC CONTROLLED
EUCLID CRANE
Spot-Positioning thru ease of accurate control is an outstanding performance feature of this 25 ton crane equipped with *E C & M Frequency Relay Dynamic Lowering Control. Non-overhauling loads with empty or slightly loaded hook start down slowly since weak "down power" is permissible. Euclid builds cranes in a range of styles and capacities to meet varied requirements.
*The Electric Controller & Mfg. Co.
EUCLID CRANES AND HOISTS Raise Profits
THE EUCLID CRANE & HOIST CO.
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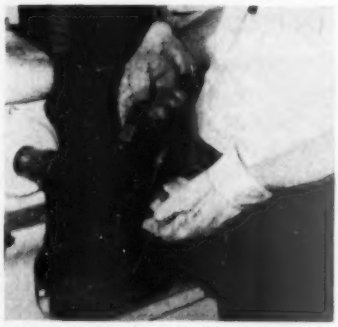
NEW MATERIALS



PLIOVIC POLYVINYL CHLORIDE RESIN, known as Pliovic G8OV, is a general-purpose, straight vinyl material with an approximate intrinsic viscosity of 0.80. The nature of this new resin makes it useful in calendered fabric, film, and sheeting, the manufacturer claims. It is available for use in clear or pigmented state. Because of its relatively low viscosity, the processing temperature of this resin is 20 to 40 degrees lower than similar materials. Made by Goodyear Tire and Rubber Co., Akron 16, Ohio.

A COPPER NAPHTHENATE WOOD PRESERVATIVE with added chemicals to increase water repellency and permit maximum penetration by the naphthenate, has been marketed by Cuprinal, Simsbury 38, Conn. Called Cuprinol, it provides protection against dry rot and wood borers, including termites, the maker says. Also reduces tendency of wood to warp, swell and shrink. When dry it is non-toxic. Can also be used as a primer coat before painting.

LACQUER FOR COATING AND DECORATING VINYLS is now being offered by Schwartz Chemical Co., Inc., 326 W. 70th St., New York 23. Known as Vinaplas-Lac, it is nontoxic and washable. Furthermore, it dries in less than 5 minutes and leaves a flexible, scratchproof coating, the manufacturer claims.

Turn the page

LINDE'S News of Metalworking

New Machine Carriage Saves Time On Many Jobs

A new machine carriage in the low-priced field does dozens of metalworking jobs—and does them more quickly, accurately, and uniformly than the most skilled hands. This machine, the OXWELD CM-45, handles practically all machine carriage requirements in small metalworking shops, and supplements heavier equipment in larger plants, shipyards, and mills.

Used on track, the CM-45 is ideal for accurate straight-line cutting. It also cuts top or bottom bevels at practically any angle. With standard radius rods, it cuts circles with diameters of from 2 to 54 inches. To cut larger circles, a longer radius rod can easily be substituted.

Flame-treating work—be it flame-hardening, flame-softening, or low-temperature stress relieving—requires precisely controlled heat. With the CM-45 and appropriate heating apparatus, you get just that; thus you can be sure that each of your flame-treating jobs will be done uniformly.

These are only a few of the jobs that the OXWELD CM-45 Machine Carriage will do for you. Many additional cutting, welding, and heating applications will be suggested by the requirements of your own shop.

The CM-45 saves you time, not only because it does each job efficiently, but also because it is so easy to set up and operate. There is no complicated machinery to master. Its simple design makes it easy to adjust or repair. All parts are readily accessible.

Operating controls consist of a speed-control dial that can be preset or adjusted at any time, and a two-position clutch lever. All controls are grouped together at the rear of the machine for your convenience.

Since the machine weighs only 33¾ lb. complete with cutting blowpipe (as shown in Fig. 1), it's an easy, one man job to move it from one section of your shop to another. The machine's compactness also makes it convenient for use in close quarters where larger machines cannot be used.

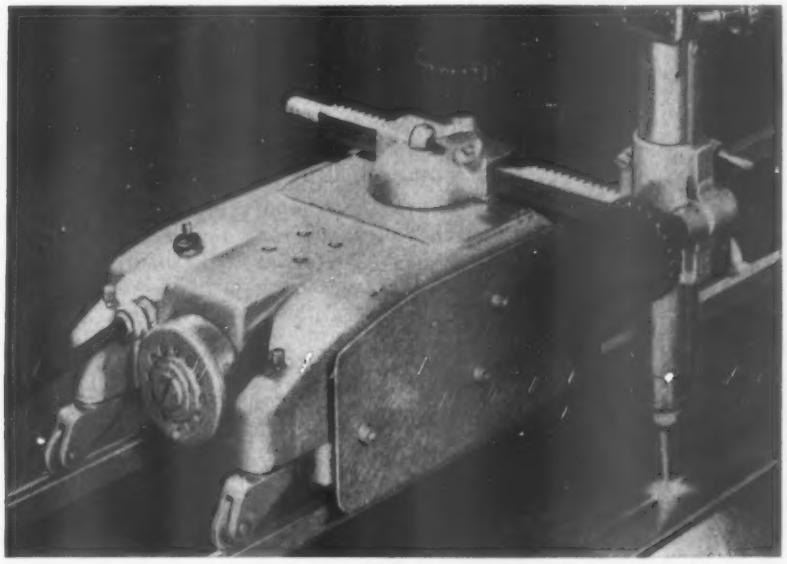


Fig. 1—Cut straight lines or bevels in plate or other steel forms. For all the CM-45's many jobs, a stepless speed range of 4 to 32 in. per min. is available

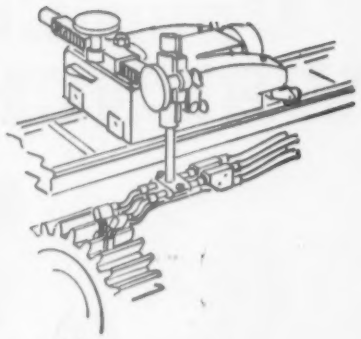


Fig. 2—Flame-treating work requires precise control of applied heat. The CM-45, with suitable apparatus, assures you of efficiency and uniformity on every job.

Any LINDE representative will gladly show you how the OXWELD CM-45 Machine Carriage will help you turn out more work in less time. Call the nearest LINDE office today for a free demonstration.

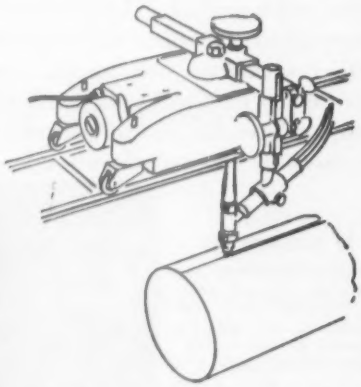


Fig. 3—Do special welding jobs, such as tube fabrication, quickly with the CM-45. Rejects are reduced to a minimum.

The terms "Linde" and "Oxweld" are registered trade-marks of Union Carbide and Carbon Corporation.

LINDE AIR PRODUCTS COMPANY
A Division of Union Carbide and Carbon Corporation
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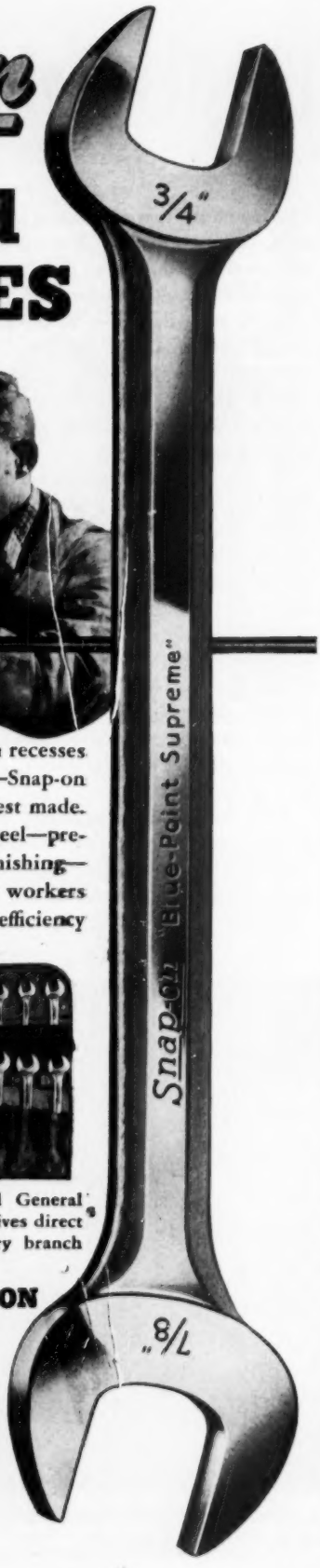
*Snap-on

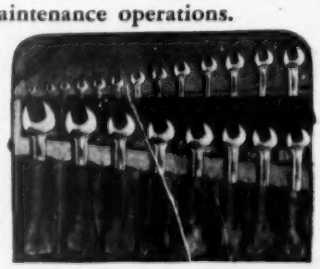
"Blue-Point Supreme"

Open End WRENCHES



For jobs like this—or where nuts are set in recesses too narrow for other types of wrenches—Snap-on open end wrenches are the strongest, safest made. Every detail of design—the tough alloy steel—precision machining—heat treatment and finishing—are highest quality. In the hands of your workers Snap-on wrenches will contribute greater efficiency to assembly and maintenance operations.

OE-821-K.
21 WRENCH SET
In kit as illustrated. Contains all standard sizes, ¼" to 1⅛". Most sizes duplicated on different handles to meet requirements of many jobs.



Write for Snap-on Industrial Catalog and General Catalog of 4000 hand and bench tools. Snap-on gives direct service to industry everywhere through factory branch warehouses in principal industrial centers.

SNAP-ON TOOLS CORPORATION
8044-D 28th Avenue, Kenosha, Wisconsin

*Snap-on is the trademark of Snap-on Tools Corporation

NEW MATERIALS

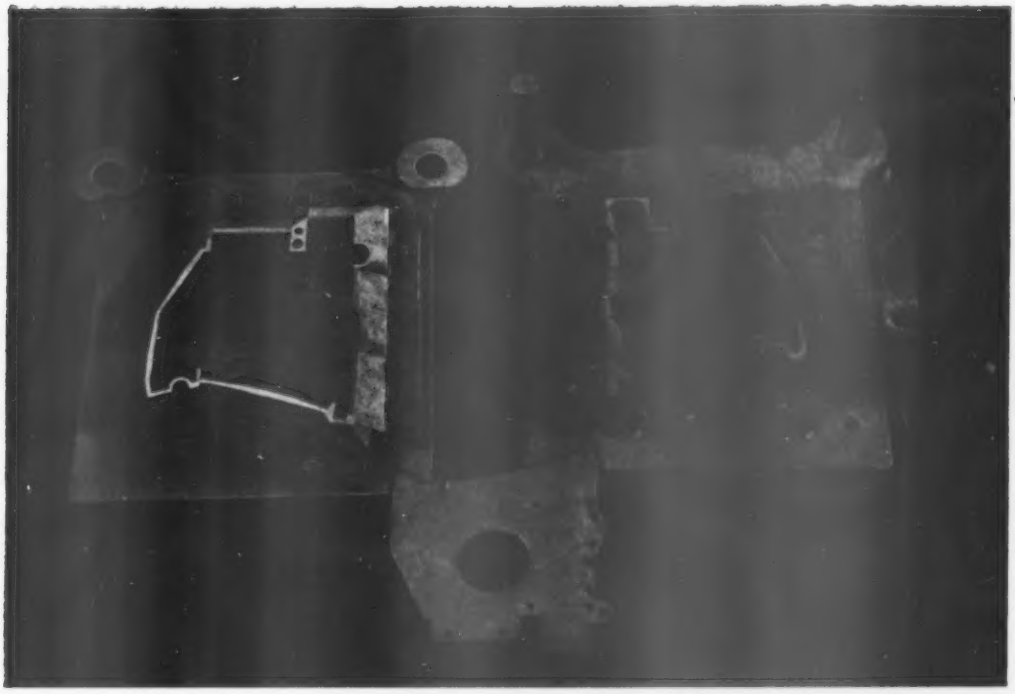
Begins on page 308

PLASTIGLAS is a woven glass fabric designed especially for outdoor use by Flexfirm Products, El Monte, Calif. This new material holds its color, is rot and mildew proof, and will not stretch, shrink, or crack, the maker says. It can be cleaned by simply washing down with water. In the price range of canvas with longer life expectancy.

HIGH-CONDUCTIVE SPRING MATERIAL that has spring properties comparable to that of hardened steel has been announced by the Metals & Controls Corp., Attleboro, Mass. Known as Conflex, it is a composite metal consisting of a layer of medium-carbon steel with a thin layer of electrolytic copper on one or both sides. It is low in cost when compared to hardenable copper alloys, has high thermal and electrical conductivity, can stand extreme forming because of good ductility, and is resistant to corrosion, the maker claims.

FIREPROOF MICARTA PLASTIC formed by placing a 1/16-in. sheet of aluminum between layers of melamine plastic is offered by the Westinghouse Electric Corp., Box 2099, Pittsburgh 30. Available in all combinations for decorating offices and some plant facilities. The bond between aluminum and plastic is so strong that it can be subjected to widely fluctuating extremes of temperature and humidity without breaking, the fabricator says.

TUNGSTEN ZIRCONIUM ALLOY ARC WELDING ROD, called Zirtung, is being manufactured by Sylvania Electric Products, Inc., 1740 Broadway, New York 19. The rod features less contamination pick-up on torch starting, continued steady arc, and longer life, the maker says.



How to *Cut Costs and "Corners"* on Your Blanking Dies

Write for New Booklet:

COMPOSITE DIE SECTIONS

Contains complete data on 35 Standard Die Sections, from combinations of which thousands of die shapes can be made —also full information on Special Die Sections, and how to order.

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You can save steel and time in the making of dies for blanking, trimming, beading, or any application involving the cutting of sheet metals to regular or irregular shapes, by assembling them from FCC Composite Steel Die Sections.

These prefabricated die parts consist of fine tool steel cutting edges, in a selection of grades, electrically welded by a special process to non-hardenable mild steel bases. Thus, screw and dowel holes may be easily drilled after heat treating, and there are numerous other advantages that will be immediately obvious to the die maker.

Thousands of die shapes may be made up from combinations of thirty-five standard sections. Specially shaped sections are manufactured to customers' specifications in five to ten days.

Make *your* dies this money-saving way. ● *Write Allegheny Ludlum Steel Corporation, Forging & Casting Division, Wanda & Jarvis Aves., Detroit 20, Mich.*

For complete MODERN Tooling, call

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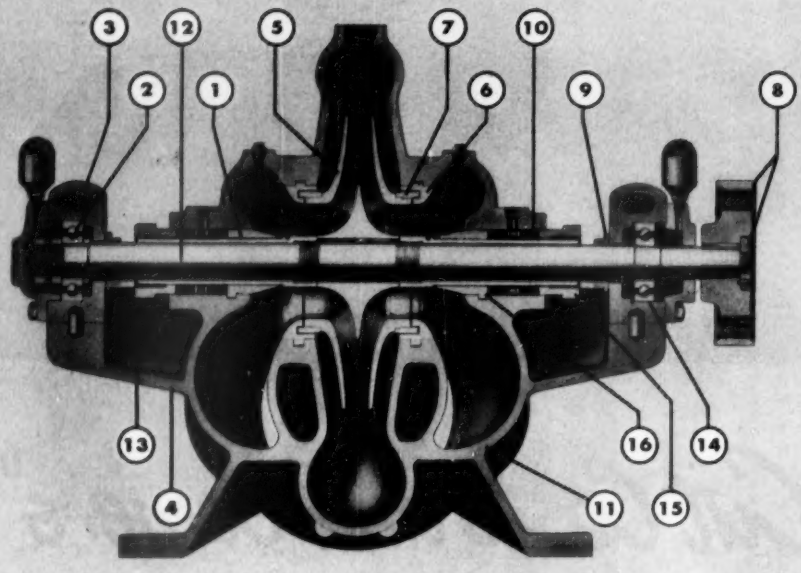
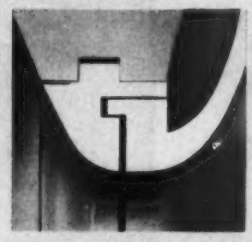
FINE TOOL STEELS
SINCE 1854

DE LAVAL
SINGLE STAGE CENTRIFUGAL PUMPS

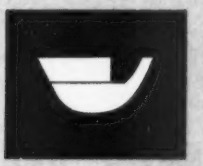
for dependable industrial service



Labyrinth wearing rings minimize leakage...maintain high efficiencies



Labyrinth rings used in these De Laval pumps retard flow of water through labyrinth passage.



Flat rings showing relatively unimpeded flow of water.

① **Shaft Sleeves** are screwed on, to abut the impeller and make a water-tight joint. Sleeve expands freely and independently of shaft when temperatures change. There is no tendency to buckle.

② **Thrust Bearing** locates rotor axially.

③ **Bearing Caps** easily removable for maintenance.

④ **Bearing Brackets** scraped to lining bars for perfect alignment.

⑤ **Impeller** hydraulically balanced, finished on all surfaces.

⑥ **Labyrinth Wearing Rings** held accurately in machined grooves in both case and cover.

⑦ **Impeller Wearing Rings** threaded on impeller, opposite to rotation.

⑧ **Flexible Coupling** ground on all exposed surfaces and statically balanced, complete coupling supplied, pump half mounted on taper so that it can be easily removed. Check nut locks coupling on taper.

⑨ **Deflector** keeps water out of bearing.

⑩ **Stuffing Boxes** extra deep; lantern rings for water sealing.

⑪ **Pump Case** horizontally split; machined to limit gages.

⑫ **Steel Shaft** ground to limit gages.

⑬ **Drip Boxes** large; provided with drain openings.

⑭ **Radial Bearing** free to move axially, thus avoiding temperature strains.

⑮ **Glands** split horizontally.

⑯ **Protecting Bushings** renewable.

You can count on the performance of the De Laval Single Stage Centrifugal Pumps because they are precision-made to high manufacturing standards and incorporate the many quality design features shown in the cross-section.

They operate at high or low speeds, at high or low heads...with maximum efficiency.

For example, De Laval G, I and K Single Stage Double Suction Pumps have a capacity range of 175 gpm to 6,000 gpm, and heads to 300 feet. They are available in sizes ranging from 4" suction and 3" discharge to 14" suction and 12" discharge. Write for Bulletin 1002.

DeLaval also furnishes larger centrifugals for capacities up to 70,000 gpm. Bulletin 83-29R sent on request.

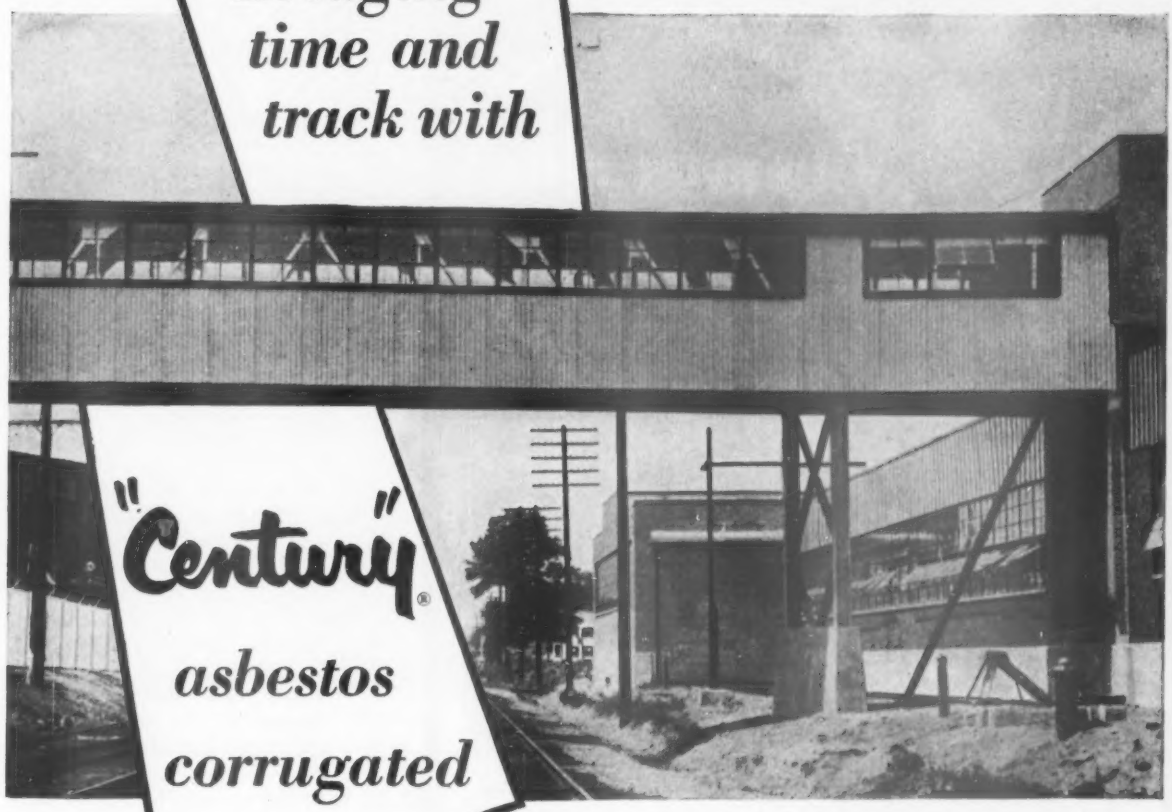
DE LAVAL *Centrifugal Pumps*

DE LAVAL STEAM TURBINE COMPANY

804 Nottingham Way, Trenton 2, New Jersey

DL 104

Bridging time and track with



"Century"® asbestos corrugated

Inter-plant bridge of the Trumbull Electric Department of the General Electric Co. in Plainville, Conn. Sidewalls of bridge and the building on the right constructed of "Century" Asbestos Corrugated, and applied by Hampden Cornice Works Inc., Springfield, Mass. Supervisor of Construction: General Electric Realty Corp., Schenectady, N.Y. Engineer and Architect: Lockwood Greene Engineers Inc., New York, N.Y. General Contractor: The Gellatly Construction Co., Bridgeport, Conn.

"Century" Asbestos Corrugated makes an ideal siding for this new inter-plant bridge and building because of its outstanding durability and freedom from maintenance. After many years this long-lived siding will still be sound, serviceable, and weather-tight.

If that's the kind of dependable siding and roofing *you* are seeking, you ought to know more of the many advantages in using "Century" Asbestos Corrugated. Here are a few facts about this versatile, economical material:

It is made in large, strong sheets from portland cement and asbestos fiber—therefore *cannot* burn, rot or rust. It is impervious to rodents and termites. It is completely, permanently weatherproof. Although it never needs paint, it will take decorative colors well.

"Century" Asbestos Corrugated has proved itself to be a maintenance-free and long-lasting building material—well worth your close consideration. We shall gladly send you complete information on request.

Nature made Asbestos . . .
Keasbey & Mattison has made it serve mankind since 1873.

K&M Spell it in asbestos®

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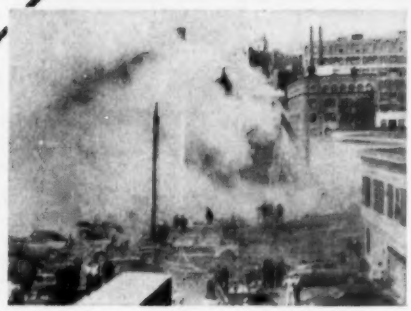
"Automatic" Sprinkler

10 point FIRE PROTECTION

spells the difference between



PROFIT and LOSS!

This scene of a manufacturing plant going up in smoke and flames is repeated scores of times daily throughout the country. Newspapers referred to this one as a "half million dollar blaze." But, they were only talking about the building and its contents. They didn't refer to losses in terms of out-of-service time, lost customers, inflated costs of rebuilding, destroyed records, vanishing profits. No, those losses are intangible—yet, just as real, just as eminent as the physical cost of fire destruction.

"Automatic" Sprinkler 10 Point Fire Protection is an absolute safeguard against fire loss, tangible and intangible. It's a profit making service that saves you money whether you have a fire or not . . . saves your business if you do!

Get The Facts: Write for informative 36-page booklet, "The ABC of Fire Protection." It's free!

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BOOKS

For All Operating and Staff Executives

REACHING OUT IN MANAGEMENT

By William D. Given, Jr. Harper and Bros., New York, 175 pp. $2.50.

The "reaching out" policy adopted by the American Brake Shoe Company (where the author is chairman of the board) encourages employees to cross organizational boundaries for the purpose of helping and criticizing other departments.

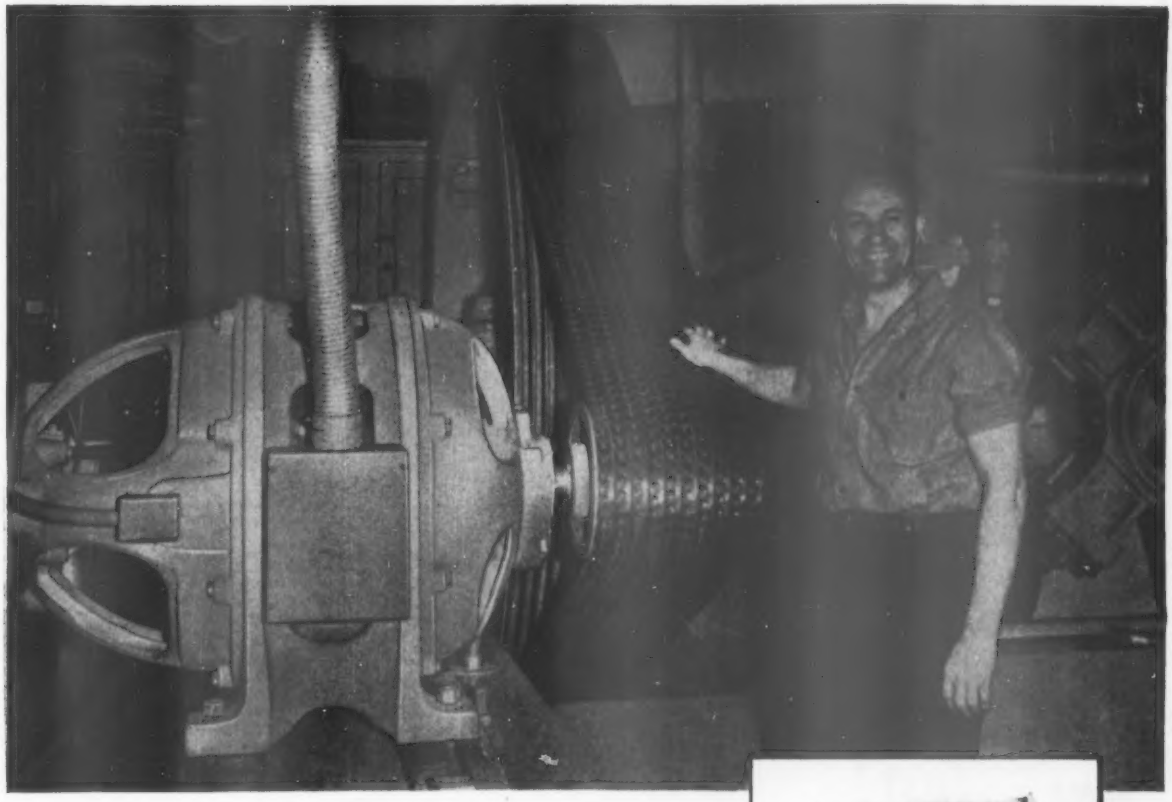
It is designed to give every employee an opportunity to gain greater satisfaction both in his work and personal life. All employees can participate.

The inherent danger of provoking bad relations between sections of the organization is recognized by the author. However, it is his belief that if the employees are thoroughly convinced of management's sincerity this pitfall can be virtually eliminated.

Having an interest in company people, willingness to gamble on their ability, and providing opportunities for their advancement are three requisites of management if employees are to attain personal fulfillment. But, Mr. Given adds, management has not completely carried out its responsibility unless it leads men to grasp and capitalize on the surrounding opportunities.

In this book, Mr. Given, after explaining the philosophy of "reaching out," illustrates how it has been applied in the research, sales, purchasing, and accounting departments of his company. He also discusses the relation of the policy to community activity. Mr. Given also wrote *Bottom-up Management*.

Turn the page



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For full vibrationless power delivery, for fast adjustability to keep sets matched, for ease of controlling inventory and for quick, simplified replacement — standardize on Veelos.

Have you seen this Veelos Facts Book?

Your Veelos v-belt distributor's salesman will be glad to give you a quick trip through this fact-packed, 36 page book. You'll find it well worth the few minutes it takes. Next time the salesman calls, ask him to show it to you.

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THE LINK
V-BELT

Write for a copy of the VEELOS DATA BOOK. It's fully illustrated and packed with useful engineering data. We'll be glad to send a copy along and you'll be glad to have it!

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ENDS PRODUCTION JAMS . . . *fast!*

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The 'Load Lifter' lifts a 1000-lb load one foot per second — at the push of a button. One hand is always free to guide the load. No muscle strain. Smooth, effortless lifting keeps workers at peak efficiency.

Steel suspension, powerful load and motor brakes, over-capacity load hook, and only 24 volts at the push button make the rugged 'Load Lifter' completely safe for heavy-duty lifting. Heat-treated helical gears and ball bearings throughout assure long service life. Capacities range from 1000 lbs. up. Single and two-speed control available. Get full details. Write for Bulletin 399.

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BOOKS

Begins on page 314

Book Briefs

EXECUTIVE PAY PLANS

A study of techniques developed and used by major companies to reward executives adequately for their achievements and efforts. Some of the methods of compensating executives described are through stock options, deferred pay and pension arrangements, family maintenance, expense arrangements, insurance, and other benefits. By William J. Casey and J. K. Lasser. Business Reports, Inc., 225 W. 34th St., New York 1. 160 pp. $12.50.

FACING THE FUTURE'S RISKS

A collection of works by distinguished authorities in many fields of endeavor compiled under the auspices of the Mutual Insurance Companies of America to commemorate the two hundredth anniversary of Benjamin Franklin's founding of the first mutual insurance company. This book is made up of stories of the past and sober estimates of the future. Edited by Lyman Bryson. Harper and Bros., New York. 318 pp. $4.

INDUSTRIAL SAFETY

Seven authorities in the field of safety engineering have combined their talents to compile the data for this book. It was written to introduce the problems of accident prevention to all members of management. Some aspects covered are causes of accidents, prevention, inspection, safeguarding machinery, safety education, and specific accident hazards. Edited by Roland P. Blake. Prentice-Hall, 70 Fifth Ave., New York 11. 474 pp. $7.90.

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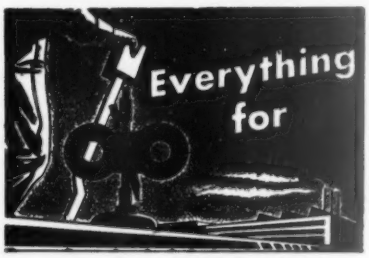

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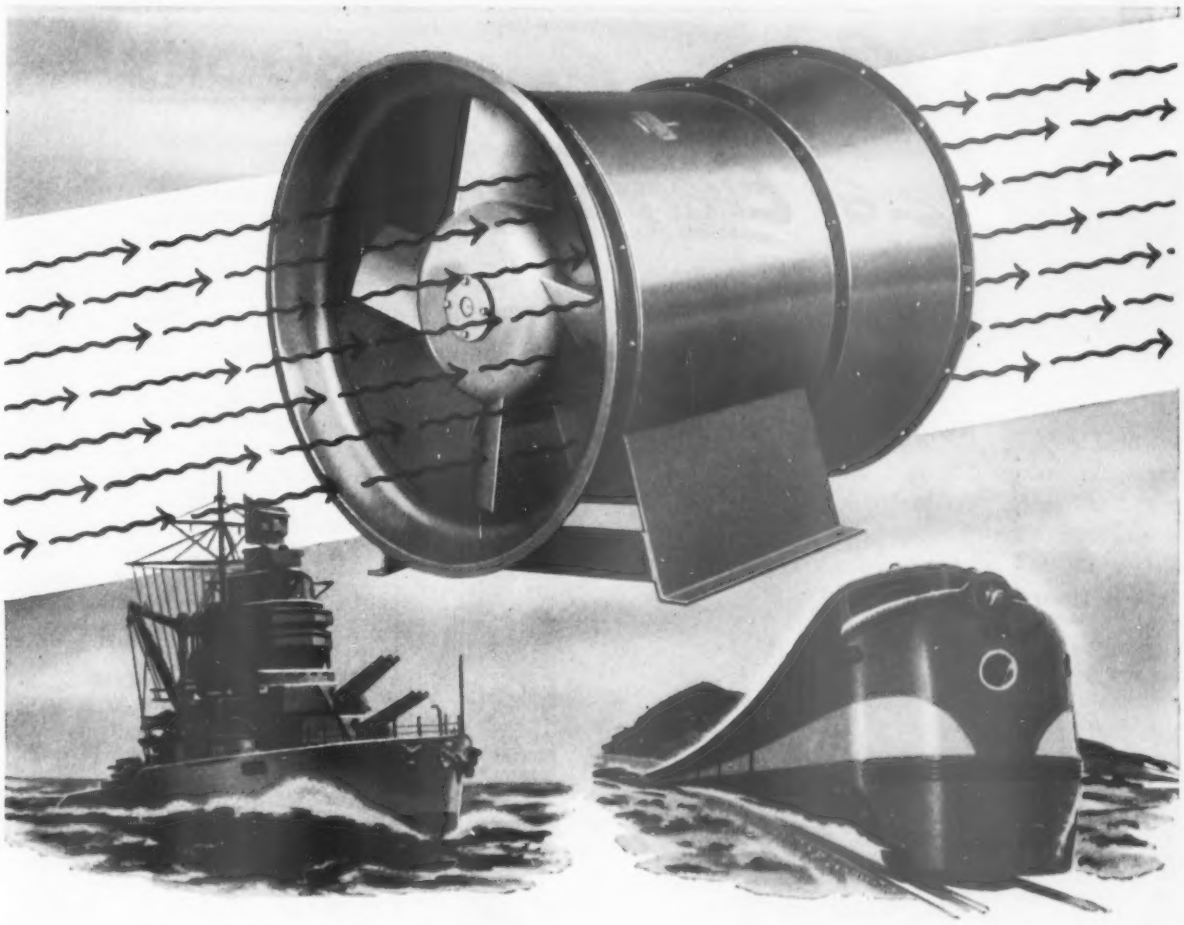

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No one company has done more to provide dependable low cost ventilation than American Blower.

For example, American Blower Axial Fans are widely used in thousands upon thousands of varied applications, and are unsurpassed for ease of installation and efficient performance.

For complete information on axial fans and other American Blower Air Handling equipment, contact our nearest branch office.

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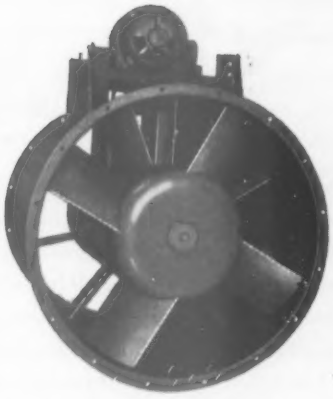
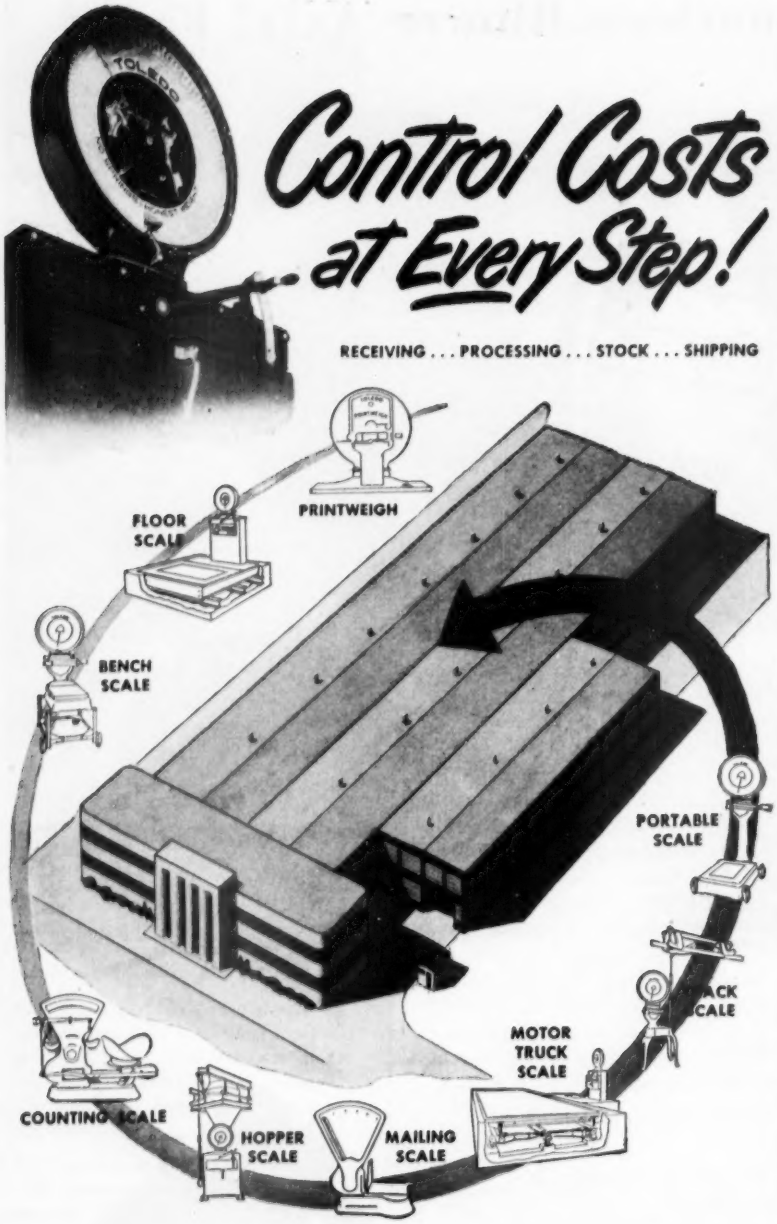


American Blower Axial Fans are smooth in performance, built for endurance and convenient to install.

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS



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BOOKS

Begins on page 314

COMUNITY PLAN FOR INDUSTRIAL SURVIVAL

Investigation and recommendations on the important subject of post-attack industrial rehabilitation. Prepared by a representative committee of the San Francisco Bay Area Council in cooperation with the Stanford Research Institute, for the National Security Resources Board. This study was conducted by leaders of business, labor, and government, emphasizes need for action in the pre-attack period. Stanford Research Institute, Stanford, Calif. 92 pp. $2.

SERVOMECHANISM ANALYSIS

A text for the senior or graduate engineering students on the mathematical theory of servomechanisms. This book stresses the elements of analysis as a necessary preliminary to design. McGraw-Hill Book Co., 330 W. 42nd St., New York. 414 pp. $7.50.

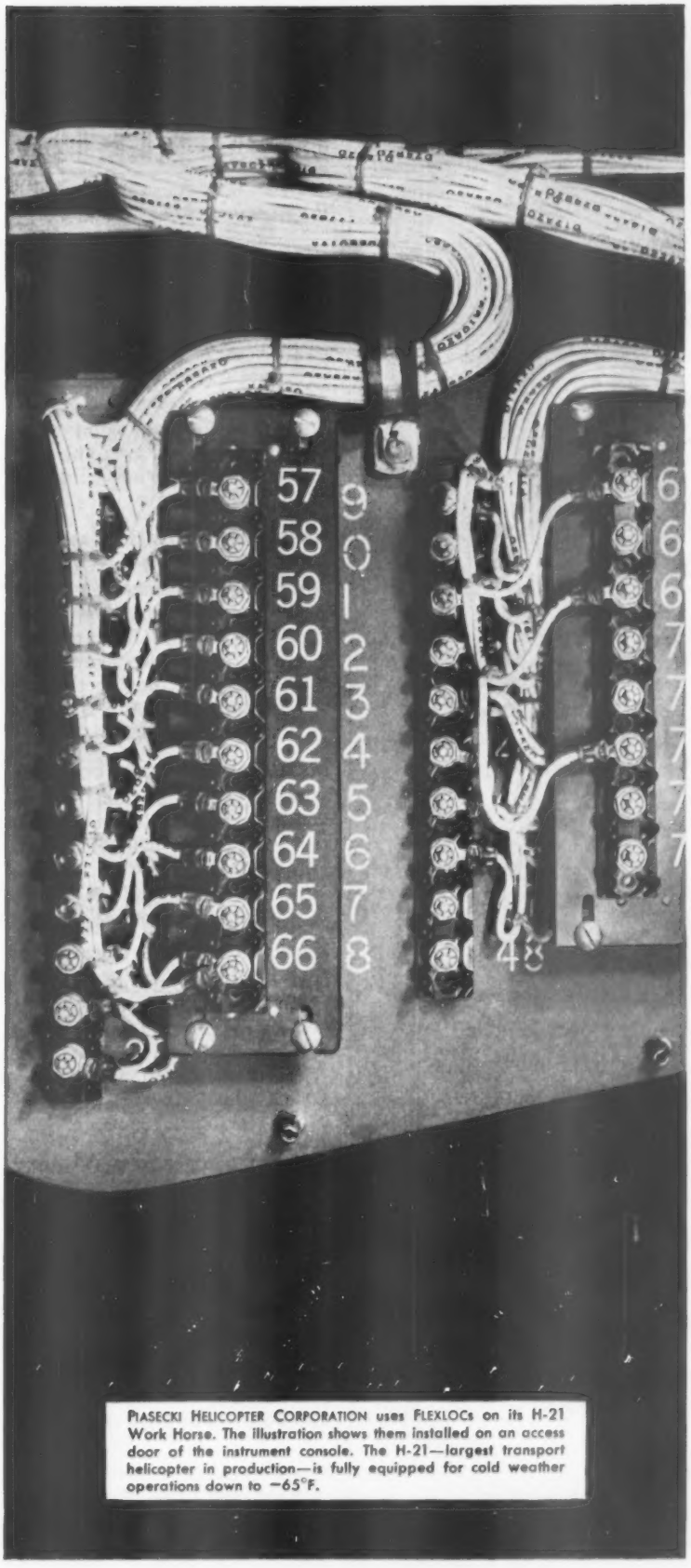
EXECUTIVE RETIREMENT

Another book on retirement, this time for top and middle management executives. The information is based mostly on interviews with business people and retired executives. Lots of facts and figures on how to retire happily. By Harold R. Hall. Division of Research, Harvard Business School, Soldiers Field, Boston 63. 298 pp. $3.75.

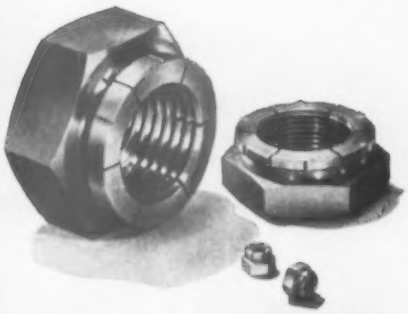
THE WONDERFUL WEALTH MACHINE

An explanation of the economic system as it applies to the individual business, whether small or large, and the government. Illustrated with cartoons. By Phil Grant. Devin-Adair Co., 23 E. 26th St., New York 10. 445 pp. $4.50.

Turn the page



PIASECKI HELICOPTER CORPORATION uses FLEXLOCs on its H-21 Work Horse. The illustration shows them installed on an access door of the instrument console. The H-21—largest transport helicopter in production—is fully equipped for cold weather operations down to −65°F.



Why use FLEXLOC locknuts?

The answer is simple. They hold assemblies together, and won't work loose like ordinary nuts. Once you install these one piece, all metal nuts, you can forget them. Yet they can be easily removed and can be reused again and again.

No fastening job is too tough for a FLEXLOC. Whether it's on an access door of a Piasecki Helicopter or the picker stick of a high speed loom, a FLEXLOC stays put.

FLEXLOCs save production and maintenance time. They are one piece, all metal—nothing to assemble, come apart, lose or forget. Standard FLEXLOCs have higher tensile than most other nuts—and because they are all metal, are not affected by temperatures to 550°F.

SPS can deliver any quantity of FLEXLOCs in a wide range of sizes. Stocks are carried by industrial distributors. Write for literature and samples. SPS, Jenkintown 11, Pa.

FLEXLOC®

LOCKNUT DIVISION

SPS

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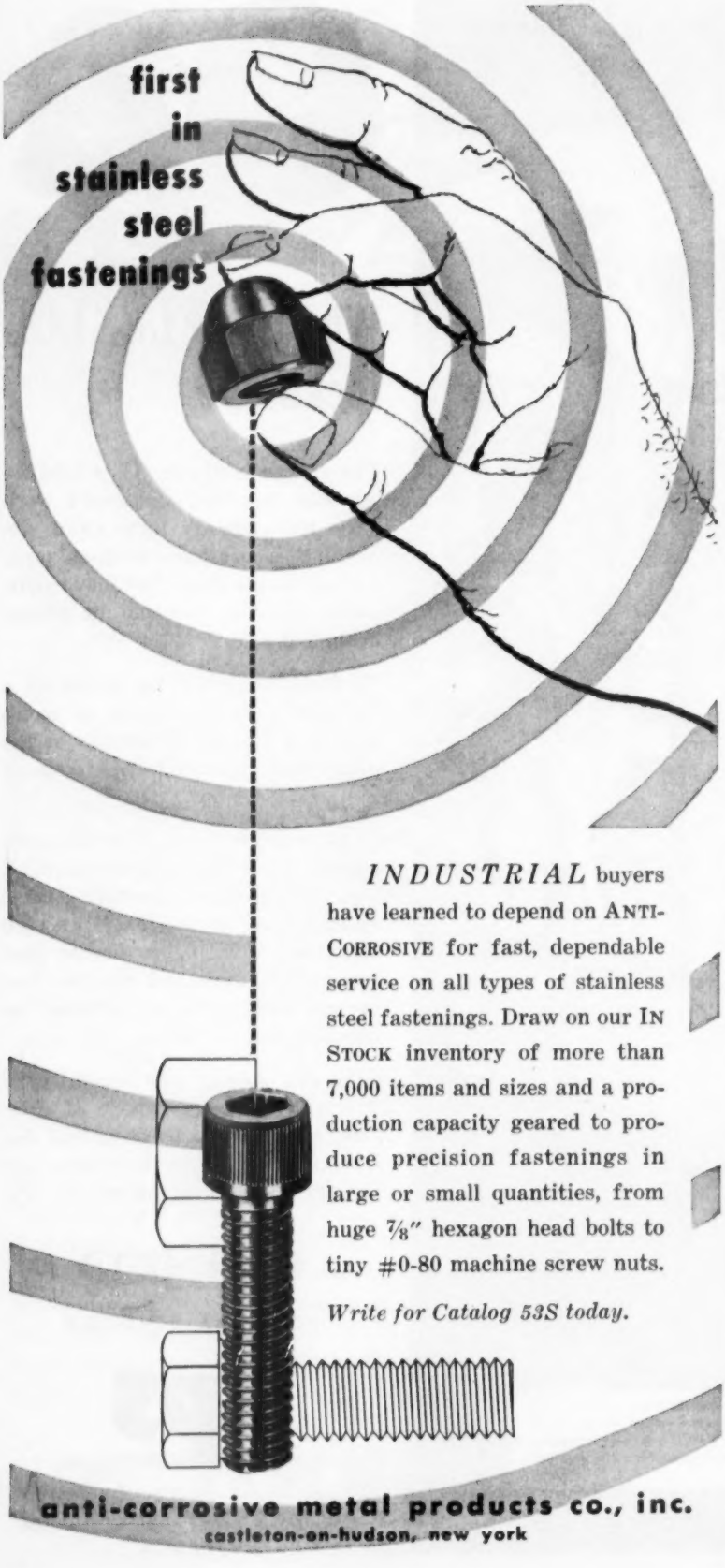
Our Fiftieth Year : A START FOR THE FUTURE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castleton-on-hudson, new york

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BOOKLETS

Begins on page 314

MATERIALS HANDLING published by the Industry Educational Committee of the Materials Handling Institute, Inc., 811 Clark Bldg, Pittsburgh. Covers the general rules, analysis, and cost data for the installation and maintenance of an effective handling system. No. 2 in the Library of Know-How series. 50¢.

MANPOWER UTILIZATION AND NATIONAL SECURITY. Proceedings of a conference sponsored by the Engineering Manpower Commission of the EJC in cooperation with the Western Society of Engineers. Engineers Joint Council, 29 W. 39th St., New York 18. 56 pp. $1.

COLOR STANDARDS AND COLOR RESEARCH. American Color Trends, Research Division of Faber Birren & Co., 500 Fifth Ave., New York 36. Free. A complete review of available standards on colors.

AMERICAN STANDARD SAFETY CODE FOR FORGING AND HOT METAL STAMPING. This code applies to all classes of power-forging machinery and incidental operations and equipment. American Standards Assn., 70 E. 45th St., New York 17. 26 pp. $1.

COMPRESED AIR POWER IN INDUSTRIAL PRODUCTION. Directed to desginers, engineers, and production men in industrial designers, engineers, and proplants. Compressed Air & Gas Institute, 1410 Terminal Tower, Cleveland 13. 33 pp. 25¢.

PLANT-CENTERED RECREATION FOR DEFENSE WORKERS: ORGANIZATION AND ADMINISTRATION. Outlines the requirements of an effective program. National Recreation Assn, Inc., 315 Fourth Ave., New York 10. Free.

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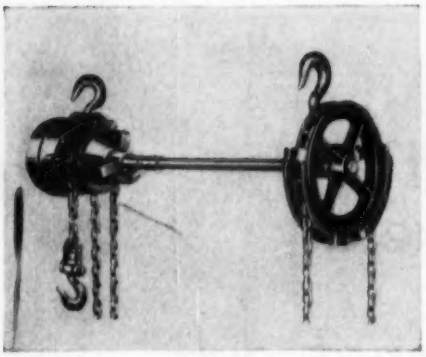
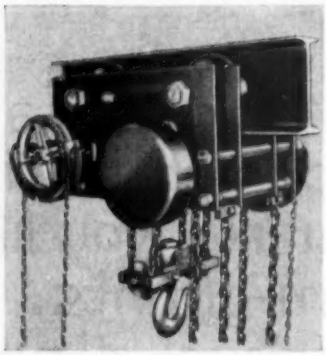


Extended Handwheel Type



Low Headroom Trolley Hoist

...get faster service at Chester!

If you have a special problem in your plant, in handling, lifting, lowering or moving... chances are excellent that there is a Chester Hoist "Special" that will simplify the operation and save you time and money.

For example, the Extended Handwheel Hoist can be efficiently operated from a safe distance in lifting and moving hot, freshly painted or other hard-to-handle loads. Or, if floor to ceiling height in your plant is too limited for standard hoist and trolley equipment, the Low Headroom type with built-in trolley can easily solve that problem.

These, and other special hoists, as well as standard Spur-Geared Hoists and trolleys, in 1½ to 25-ton capacity, are quickly available from the Chester line. Streamlined production often permits deliveries in a fraction of the usually anticipated time. If you can use a Chester Hoist "Special" to facilitate your production, ask your distributor today—or write us for the Chester catalog and tell us your "special" problem.

CHESTER HOIST DIVISION

The National Screw & Mfg. Company, Lisbon, Ohio

National PRODUCTS — FASTENERS — HODELL CHAINS — CHESTER HOISTS

INDUSTRIAL FILMS NOW AVAILABLE

"ALIGNMENT FOR BETTER GRINDING" outlines the principles of internal grinding. It points up the need for proper alignment in getting better surface finishes and reducing scrap loss. A semi-technical briefing for supervisory and management people. 30 minutes, color. Write:

Advertising Dept., Bryant Chucking Grinder Co., Springfield, Vt.

"RATIO DELAY STUDY" shows the general approach to work sampling study (FACTORY, July 1952, page 83). Describes improvements that can result from use of work sampling by supervision. 10 minutes, black & white. For purchase at $40, or write:

Wolverine Tube Division, Industrial Engineering Dept., 1411 Central Ave., Detroit 9.

"PREHEATING AND STRESS RELIEVING" describes methods used in welding alloy steels on high pressure, high temperature piping systems. 15 minutes, black & white. For free loan, write:

Electric Arc, Inc., Advertising Dept., 152 Jelliff Ave., Newark 8, N. J.

"THIS IS MAGNESIUM" tells how the metal is extracted from seawater and shows its many uses. 15 minutes. Write:

U. S. Bureau of Mines, Graphic Services Section, 4800 Forbes St., Pittsburgh 13.

"FLAMEFOIL CANVAS PROTECTION" reviews the uses of canvas in industry and tells how it protects against fire, water, weather, and mildew. Also describes research and testing in canvas impregnation. 20 minutes, color. Write:

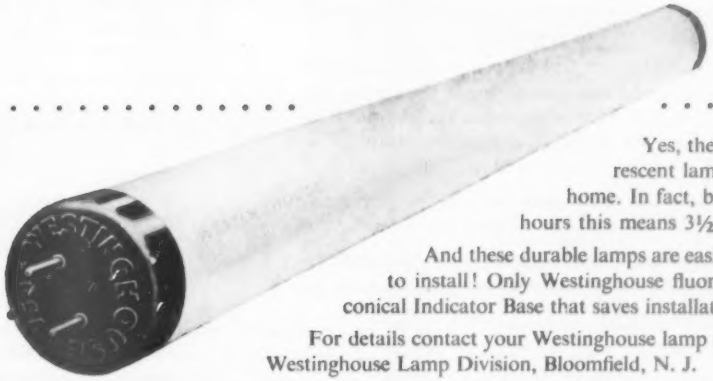
The Princeton Film Center, Inc., Princeton, N. J.

Turn the page

HE'LL GROW FROM THIS

TO THIS

BEFORE YOUR WESTINGHOUSE FLUORESCENT LAMP BURNS OUT



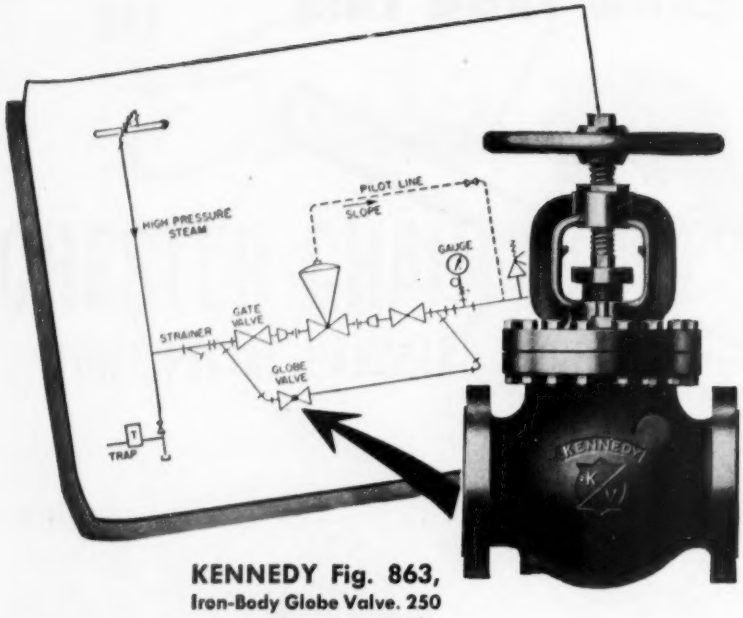
Yes, the standard Westinghouse Fluorescent lamp lasts for years in the average home. In fact, based on the rated life of 7500 hours this means 3½ years in an office or factory.

And these durable lamps are easier, safer, and more convenient to install! Only Westinghouse fluorescent lamps have the special conical Indicator Base that saves installation time—and thus money.

For details contact your Westinghouse lamp supplier or write Westinghouse Lamp Division, Bloomfield, N. J.

See our three popular TV shows every week ... Freedom Rings ... Westinghouse Studio One ... Meet Betty Furness

YOU CAN BE SURE ... IF IT'S Westinghouse



KENNEDY Fig. 863,
Iron-Body Globe Valve. 250 pounds of steam at 500°F.

Here's how to set up pressure-reducing lines for easier maintenance

You naturally don't want to shut down a vital part of your operation when you repair a single valve.

You can avoid doing so by installing a by-pass around your pressure-reducing valve and installing a globe valve in the by-pass line. With this set-up you can use the globe valve for hand throttling when the reducing valve is removed from the line for repairs.

KENNEDY JOB-FITTED IRON-BODY GLOBE VALVES are designed and constructed for high pressures and severe service on steam or water lines and for heavy-duty service with oil, gas and other fluids that do not corrode bronze or iron.

Individual valves in the KENNEDY JOB-FITTED line are specially designed with the proper disc and seat trim to match the service for which they are recommended. Valves with either renewable composition or bronze faced discs are available, depending on the pressure in the line.

REPACK UNDER PRESSURE—You can repack ALL KENNEDY iron-body globe valves under full line pressure when wide open.

THE COMPLETE LINE of KENNEDY JOB-FITTED valves and INSPECTED fittings is sold through local distributors who are in a position to give you fast and convenient service.

THE KENNEDY
VALVE MFG. CO. • ELMIRA, N.Y.
Est. 1877
VALVES • PIPE FITTINGS • FIRE HYDRANTS

FILMS ... *Begins on page 382*

FILM PROGRAM OF THE MONTH

RADIOISOTOPES

Here's a list on selected films on radioisotope technology. They supplement and illustrate the information you'll find in this month's article on radioisotopes (page 84). Why not use them as part of your radioisotope training program?

"ENGINEERING FOR RADIOISOTOPES" Describes how radioisotopes are produced. 21½ minutes. For free loan, write:

Public Information Service, U.S. Atomic Energy Commission, Washington 25.

"UNLOCKING THE ATOM" • Produced primarily to demonstrate the principles that govern the atom and its use. Runs 20 minutes. For loan, write:

Same as above.

"PRIMER OF MONITORING" • Explains the basic principles of radiation monitoring. 30 minutes. For sale at $122. Write:

Film Dept., U.C.L.A., Los Angeles.

"AN INTRODUCTION TO RADIATION DETECTION" • Gives reasons and ways of using radiation detection instruments. 17 minutes. For sale at $22.78. Write:

United World Films, 1445 Park Ave., New York 29.

"ATOMS AT WORK" • A British film on the peacetime uses of atomic energy. You watch radioactive materials being produced, handled, and used. 10 minutes. For sale at $32.50. Write:

British Information Service, 30 Rockefeller Plaza, New York 20.

"REPORT ON THE ATOM" • Shows the non-military uses of radioactive materials. Describes AEC research, shows uses already being made of radioisotopes in in-

Only DRAVO *Counterflo* Space Heaters offer you these 5 exclusive features:

Ideal for heating large open spaces in industrial, commercial and educational buildings, standard Dravo *Counterflo* Space Heaters have five exclusive advantages over other warm-air space heaters.

1 The Dravo *Counterflo* combustion method takes place in a stainless steel combustion chamber. The exhaust gases from combustion are "whirl-cooled" through two sets of economizer tubes. This four-pass heat transfer results in a minimum heating efficiency of 80%.

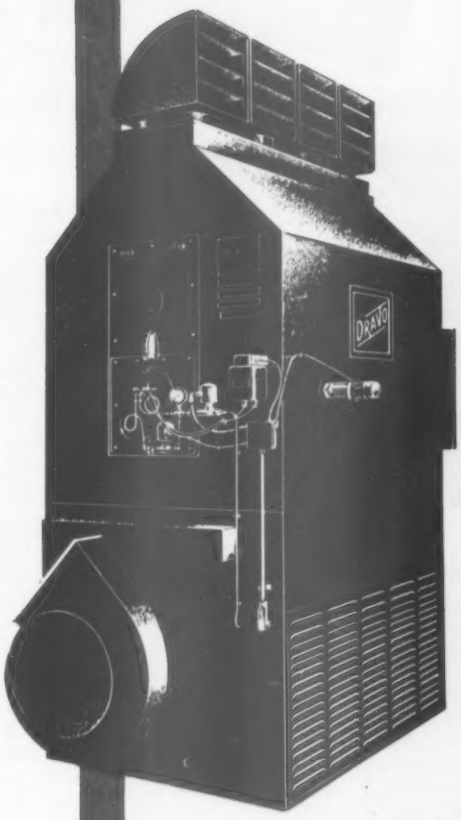
2 One rotor shaft operates all heater fans, thus co-ordinating exhaust, air-intake and heat-discharge systems.

3 Air for combustion is provided by main supply fan; volume and velocity are controlled by an adjustable damper.

4 Approved by American Gas Association and listed by Underwriters' Laboratories, Inc.; Dravo Safety Control Circuit is accepted by Factory Mutual Engineering Division.

5 Burners are designed by Dravo Engineers for top efficiency. Heaters burn gas or oil; burners are interchangeable to take advantage of fuel savings by using the most economical source of supply or in times of shortage the most available fuel.

Dravo *Counterflo* Space Heaters in addition to comfort heating are easily adapted to heat curing and process drying, tempering of replacement air and summertime ventilation. Dravo Heaters can also be tied in with air conditioning systems by making use of the same ductwork.



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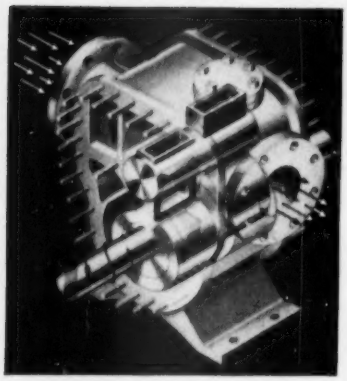
HIGHEST

GPM* **RATING**



***GPM** equals Gallons Per Manhour . . . how many gallons a pump can handle per manhour of maintenance. By this yardstick, Kinney Model SD Rotating Plunger Pump rates high. For example, a Kinney SD Pump has been in service for over 24 years handling glue in the plant of a paper specialties company and has been overhauled only once during that period. Kinney SD Pumps have earned their reputation for long-lasting dependability by delivering full rated capacity over long periods of time and under the toughest operating conditions. Kinney engineers will be glad to show you facts and figures . . . new ways to get new economy in your pumping operations. Kinney Manufacturing Company, Boston 30, Mass. Manufacturers of Vacuum and Liquid Pumps. Representatives throughout the United States and in foreign countries.

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Kinney

Kinney Manufacturing Co.
3624 Washington Street
Boston 30, Mass.

Please send Bulletin L51 describing Kinney Liquid Pumps. My liquid pumping problem involves:

Name

Company

Street

City

State

FILMS . . . *Begins on page 322*

FILM PROGRAM OF THE MONTH

dustry and research. 19 minutes. For sale at $55. Write:

McGraw-Hill Book Co., Text-Film Dept., 330 W. 42nd St., New York 36.

"RADIOISOTOPES PT. 4: METHODOLOGY" • Illustrates and explains the underlying theory and practice of radioactivity measurement. 40 minutes. For sale at $48.27. Write:

United World Films, 1445 Park Ave., New York 29.

"ATOMIC RADIATION" • Explains the fundamentals of atomic radiation, what it is and does, and why it should be respected rather than feared. Explains the roles of alpha, beta, and gamma radiation in research. Black & white, runs 12 minutes. Cost: $50. Write:

Encyclopedia Britannica Films, Inc., Wilmette, Ill.

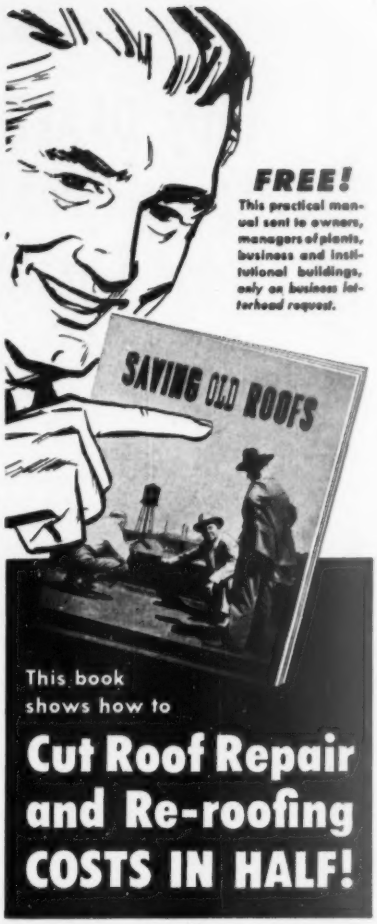
"THE ATOM AND INDUSTRY" • Shows some of the ways radioisotopes are providing new techniques of measurement and quality control in a wide variety of industries. Shows how the radiation symbol is becoming a common sight in factories. Black and white, 12 minutes. For sale at $50. Write:

Same as above.

"YOU CAN BE SAFE FROM X-RAYS" • Though it deals with X-rays rather than radioisotopes, it can be helpful in showing plant people how to handle radiation. 10 minutes. For sale at $14.09. Write:

United World Films, Inc., 1445 Park Ave., New York 29.

SORRY! *We regret that several listings in our February Film Program were in error. The Audio-Visual Center at Washington State College, which prepares the column for FACTORY, offers profound apologies (as we do, also). The Center assures us it won't happen again.*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This book shows how to
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New Trends in Mechanized Materials Handling

WITH ALLIS-CHALMERS TRACTOR SHOVELS

EXCAVATES, LOADS TRUCKS. This busy crawler has the power to dig into hard-packed materials—and bring it out, a full cubic yard at a scoop. In handling light materials, an interchangeable two-yard bucket doubles its capacity.

STOCKPILES COAL, SILICATES, ANY BULK. Traction and flotation enable this crawler to work right up on a stockpile . . . allow it to spread and compact coal in thin, horizontal layers to eliminate spontaneous combustion.

HANDLES PACKAGED AND SOLID MATERIALS. With Lift Fork in place of bucket, the HD-5G skids, carries and stacks palletized loads weighing up to 4,000 lb. Stacking height beneath forks is 106 inches.

Crawler tractors — basic machines on earth-moving and construction jobs — are now solving more and more bulk materials handling problems in industry with hydraulic front-end shovels. And spearheading this new trend is the Allis-Chalmers HD-5G — thousands of which are now in use in plants of all types. This multi-purpose crawler combines power, traction and maneuverability with a wide selection of hydraulically operated attachments for a variety of material handling jobs.

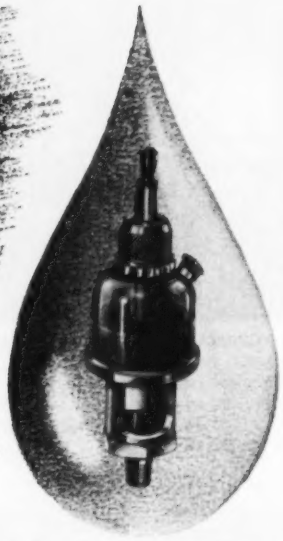
Get the full story on how crawler tractor power and versatility can help mechanize your tough jobs. Ask your Allis-Chalmers dealer about the HD-5G and these three larger tractor shovels: 2-yd. HD-9G, 3-yd. HD-15G and 4-yd. HD-20G. Light materials buckets range from 2 to 7 cu. yd.

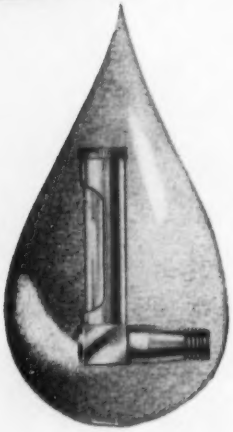
ALLIS-CHALMERS
TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

Here are a few of the other jobs the HD-5G and its attachments will handle:

Maintains yards and roads with bulldozer or shovel • Clears snow from parking areas • Moves machinery and other heavy materials with Crane Hook attachment • Spots railroad cars at loading docks • Digs trenches for pipe or foundation footings with Trench Hoe attachment

For Lubricating Devices Call On GITS First!





GITS Bros. covers the *entire range* of lubricating devices: Oil Hole Covers, Oil Cups, Grease Cups, Bottle Oilers, Gauges. Gravity-Feed, Wick-Feed, Constant Level, Vibrating Rod styles. Threaded or Drive-type. Elbow or Straight.

GITS Bros. offers the most complete selection of standard styles.

GITS consistent quality in design, materials and machining has made Gits Lubricating Devices the standard for industry for more than 40 years.

GITS Lubricating Devices are far-famed for solving tough oiling problems at low cost.

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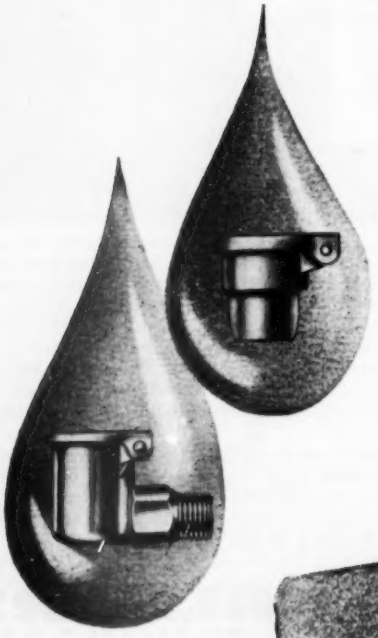
Write today for free illustrated Price Guide Catalog. Use it as your handy reference for lubricating devices.



GITS BROS. MFG. CO.

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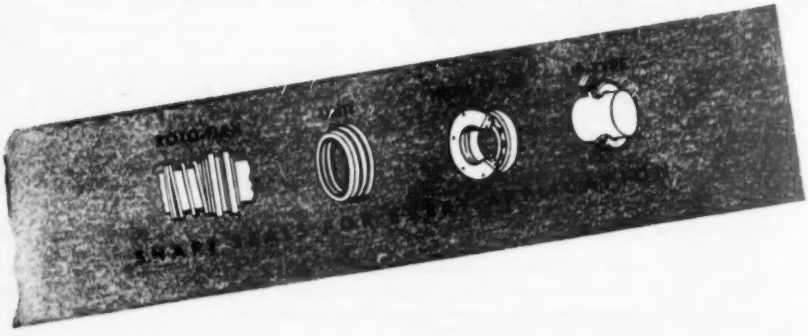


Rankin Equipment Co., Yakima, Washington, says:

"A glance at Monobloc construction is your cue to its smooth operation"

The Worthington DN monobloc centrifugal pump not only *looks* streamlined but it has a heavy balanced construction that assures perfect alignment of pump and motor for really smooth operation and long life.

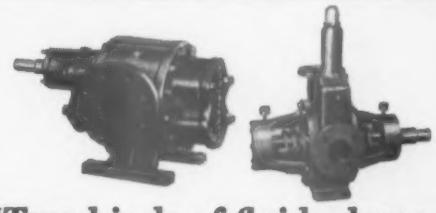
It saves you floor space and cuts installation costs with its single-base mounting. No extra foot supports or base plates! Over 30,000 sizes, variations or combinations.

The same pump unit—with conventional stuffing box or mechanical seal—is available as a frame-mounted unit in the companion type CN line.

Capacities 10 to 1,800 gpm.

See your Worthington distributor

Smith-Courtney Company, Richmond, Va., reports:



"Two kinds of fluids demand two kinds of rotary pumps"

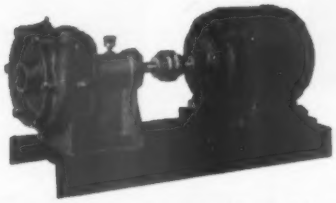
For Viscous Liquids, it's the Worthington Herringbone-Gear (GA and GR) design that eliminates end thrust, operates smoothly and quietly, and reduces bearing wear. For very thin non-lubricating liquids, it's Worthington's sliding vane (VE) types, with automatic compensation for wear, high suction lift, and replaceable wearing parts.

Capacities: Herringbone-Gear—1 to 5,000 gpm (pressures to 500 psi). Sliding Vane—25 to 1,000 gpm (pressures to 200 psi).

See your Worthington distributor

• WORTHINGTON • WORTHINGTON • WORTHINGTON • WORTHINGTON • WORTHINGTON • WORTHINGTON • WORTHINGTON • WORTHINGTON •

Biggs Pump & Supply Inc., Lafayette, Ind., advises:



"Worthite tops the list for corrosion resistance"

When you're choosing chemical pumps, you'll be off to a good start if you check the *complete* Worthite line—*standard* sizes from 1 to 5,000 gpm.

Worthington's Worthite leads the field of metals and alloys in the same price range when it comes to corrosion resistance. Users constantly report exceptional non-shutdown service records under toughest conditions.

See your Worthington distributor

All Worthington distributors agree:

"No other pump line is so complete"

A quick call to your Worthington distributor is often all it takes to bring the answer to your pump problem and many other equipment needs involved in operating your plant.

He's got the broadest line available anywhere:

Centrifugals in over 30,000 standard combinations of capacities, heads, casings and mountings, for any drive available. 10 to 1,800 gpm, coolant and circulating types, regenerative turbine types.

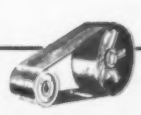
Rotaries both gear and vane types. *Steam, power,* and *dry vacuum* pumps.

Worthington Corporation, Pump and Compressor Merchandising Division, Harrison, N. J.

PC.2.8

COMPRESSORS: AIR-COOLED, WATER-COOLED

PUMPS: CENTRIFUGAL, ROTARY, STEAM, POWER



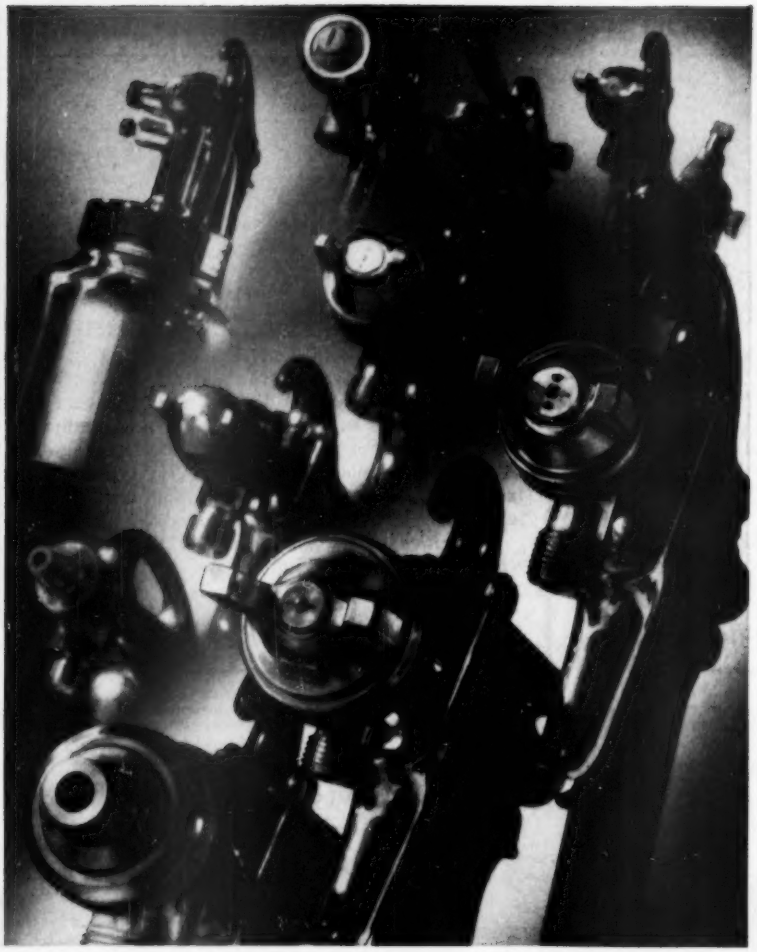
MULTI-V-DRIVES: 60 SHEAVES AND V-BELTS

VARIABLE SPEED DRIVES: WORTHINGTON ALLSPEED DRIVE, WORTHINGTON ALLSPEED MOTOR DRIVE

WORTHINGTON

Standard Pumps

Buy these Worthington standard products from your local distributor



SPRAY GUNS for every purpose and material

Today, thanks to recent developments in spray guns and material handling pumps, you can use spray guns for more jobs than ever before.

For example, the Binks line—in addition to guns for precision application of high-quality finishes—includes equipment for spraying thick sound deadeners to auto and truck bodies ...sticky tanner's paste on hides... thin, tough coatings on golf balls... fine oil films on stampings...and even flock on Christmas trees.

And this is only a beginning. With 36 gun models and 1050 nozzle combinations currently available, Binks equipment is applying materials ranging from those fluid as water to those thick as tar. So, whatever the finish or coating, Binks can tell you if spraying is possible...and what equipment to use. Send in coupon, or write: Binks Manufacturing Company, 3114-34 West Carroll Ave., Chicago 12, Ill.

For FREE booklet of painting hints, MAIL COUPON!

Binks
EVERYTHING FOR SPRAY PAINTING

Binks Manufacturing Co., 3114-34 West Carroll Ave. Chicago 12, Ill.

Gentlemen: Please rush my FREE copy of "SPRAY PAINTING HINTS," the pocket-size guide to overcoming common troubles in spray finishing. I understand there is no obligation.

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BEHIND THE BYLINE

Meet some of the men in industry who wrote articles for this issue of FACTORY.

RICHARD D. FREEMAN (page 132), who writes about training, is director of labor relations and education for Dow Chemical Co. He came to Dow as a chemist in 1935, moved over to labor relations 8 years later. He's held his present post since April 1950.

A. T. GAUDREAU (page 96) has been a materials handling consultant for many years, and is now managing partner of Gaudreau, Rimbach & Associates, management engineers. He's had more than 30 years' manufacturing and warehousing experience.

JOHN M. SHERMAN (page 138) did such an outstanding job of quality control as a foreman for Standard Pressed Steel that he was later made head of quality control.

Turn the page

Can you expect 38 years of service life from your silent chain drives?

Morse Silent Chain Drive on one of eight elevating legs. Drive is 12" wide x 1" pitch. This is one of eight Silent Chain Drives just replaced after 38 years of service.

Western Maryland Railway Company uses over three miles of belt conveyors in the big grain elevator shown below.

Sixty-five Morse Silent Chain Drives transmit power from motors of from 5 to 100 hp. to drive the belts which lift 15,000 bushels of wheat per hour or deliver 90,000 bushels per hour.

Long, long service life

Morse equipment was used in the original installation of the elevator over 38 years ago. The Morse Silent Chain Sprockets are still the original ones. So are the majority of the Morse Silent Chain Drives. The exceptions: The chain on the eight elevating legs and the chain on one of the long delivery belts were just replaced. Also, in 1922 an explosion wrecked a few drives, which were replaced and have been operating only 31 years.

See your Morse Distributor

Morse Silent Chain Drives are ruggedly built around the exclusive Morse Rocker Joint. They transmit power smoothly, noiselessly, with over 99% efficiency. Service life is unusually long and trouble free.

Do you want to reduce machine-down time? Want exceptional service life from your power transmission equipment? Want to reduce cost per hour of power transmission? Then see your local Morse Distributor about Morse Stock Silent Chain Drives —or Morse Roller Chain Drives, Morse Morflex Couplings, Morse Chain Couplings, and other Morse stock products. Look under "Chains" or "Power Transmission" in phone directory's yellow pages.

MORSE CHAIN COMPANY

Dept. 575 • 7601 Central Avenue • Detroit 10, Michigan

*

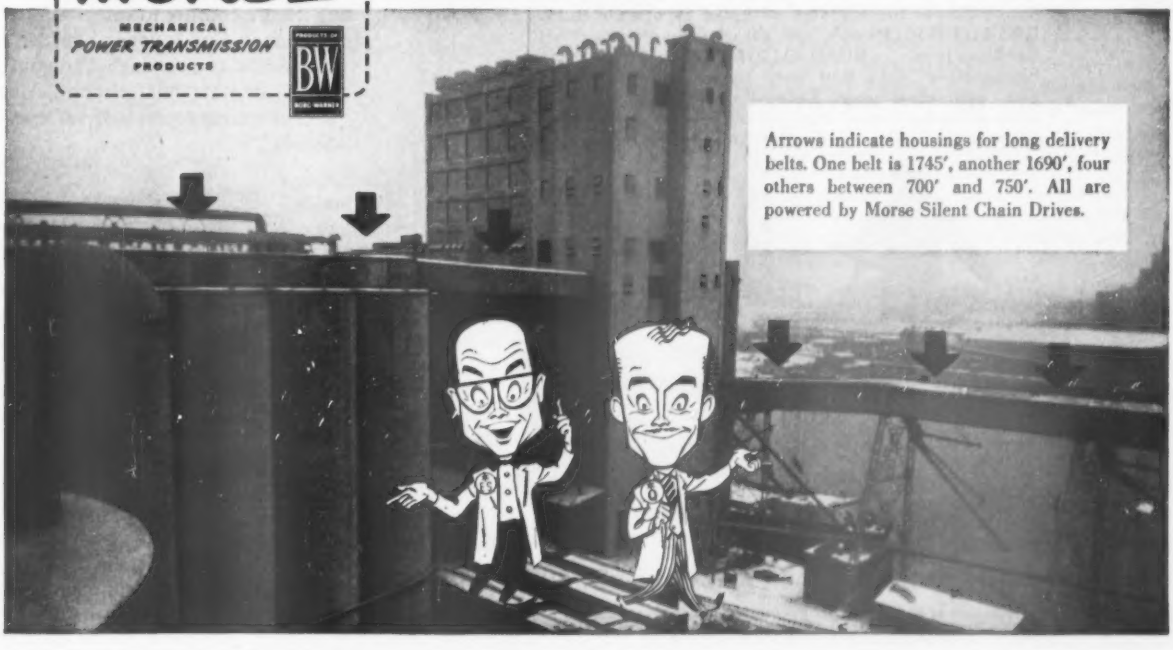
Long Service Life, Engineering Service, Quality—which you get in unusual degree when you buy Morse Power Transmission Products.

MORSE

MECHANICAL POWER TRANSMISSION PRODUCTS

BW

M=PT; Morse *means* Power Transmission



Arrows indicate housings for long delivery belts. One belt is 1745', another 1690', four others between 700' and 750'. All are powered by Morse Silent Chain Drives.

READY-POWER

GAS-ELECTRIC **DIESEL-ELECTRIC**

Now... 2 Types of Continuous-Duty Power Units

FOR ALL ELECTRIC TRUCKS

Now you can select either gas-electric or Diesel-electric Ready-Power for *any* size or make of electric truck. GAS-ELECTRIC Models are for the tough materials handling jobs . . . DIESEL-ELECTRIC Models master the "impossible" jobs that keep trucks going day and nite, year after year. Ready-Power continuous-duty drive operates electric trucks at the lowest known costs per ton mile! Write us for additional information.

5th NATIONAL MATERIALS HANDLING EXPOSITION
MAY 18-22, 1953 PHILADELPHIA

Booth 1404 & 1501

The READY-POWER Co., 3820 GRAND RIVER AVE., DETROIT 8, MICH.

Manufacturers of Gas and Diesel Engine-Driven Generators and Air Conditioning Units; Gas and Diesel-Electric Power Units for Industrial Trucks

BEHIND THE BYLINE

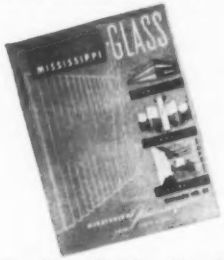
Begins on page 230

ROBERT W. BLOSSER (page 108), is supervisor of industrial engineering at the Harris Division of Harris-Seybold Co. He's responsible for manufacturing budgetary controls, cost engineering, machine tool replacement, and lots more. So he's well qualified to write about new equipment buying.

W. C. COOLING (page 114) had been an industrial engineer with U. S. Rubber and Atlantic Refining before coming to International Resistance Co. 3 years ago. He's manager of the methods and standards department there. Also teaches courses in industrial management.

NORMAN WEISSMAN worked for the past 8 months on his radioisotopes report (page 84). It's based on a file-drawerful of scource material from people who make radioisotopes their business, and on information from 80 users.

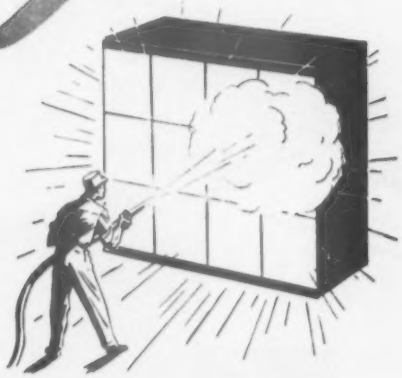
Another modern building glazed with Mississippi Wire Glass. More than 6000 sq. ft. of Polished Misco are used in this outstanding Aid Association for Lutherans Building, Appleton, Wisconsin. Architects, Cram & Ferguson, Boston, Mass., & Maurey Lee Allen, Appleton, Wis.



Send for Catalog No. 53. Free samples on request.

Specify Mississippi Wire Glass . . . the original solid wire glass upon which the Underwriters' Standard was based . . . the standard today by which all others are judged. Available in either hexagonal or Misco wire mesh in types for clear vision or diffusion. Carried in stock by distributors of quality glass everywhere.

Trial by Fire!



Mississippi Wire Glass Standard of Safety For Over Half a Century

Wire glass is the only material for glazing openings that can successfully withstand the fury of the flames in this dramatic Underwriters' Laboratory test. To qualify as Fire Retardant No. 32, the glass is first subjected to temperatures ranging up to 1600 deg. F. and later to a ¾" stream from a fire hose at 35 to 40 lbs. pressure. Passing the test requires that the glass remain in the sash substantially unchanged except for cracking due to thermal shock.

With an enviable record of protecting life and property, Mississippi Wire Glass helps bottle up fire . . . often prevents it from roaring into tragic and costly conflagration. And this proven product more than meets Underwriters' requirements — it is the standard upon which those specifications were established in 1899.

Mississippi Wire Glass affords constant protection at minimum cost in vertical shafts, partitions, exterior walls, skylights, windows, doors, and all other vulnerable locations where fire or breakage protection is desirable. A non-combustible, it offers other exclusive features in its corrosion resistance, rigidity, absence of shrinkage and in glazing advantages that far outweigh a possible slight difference in initial cost.

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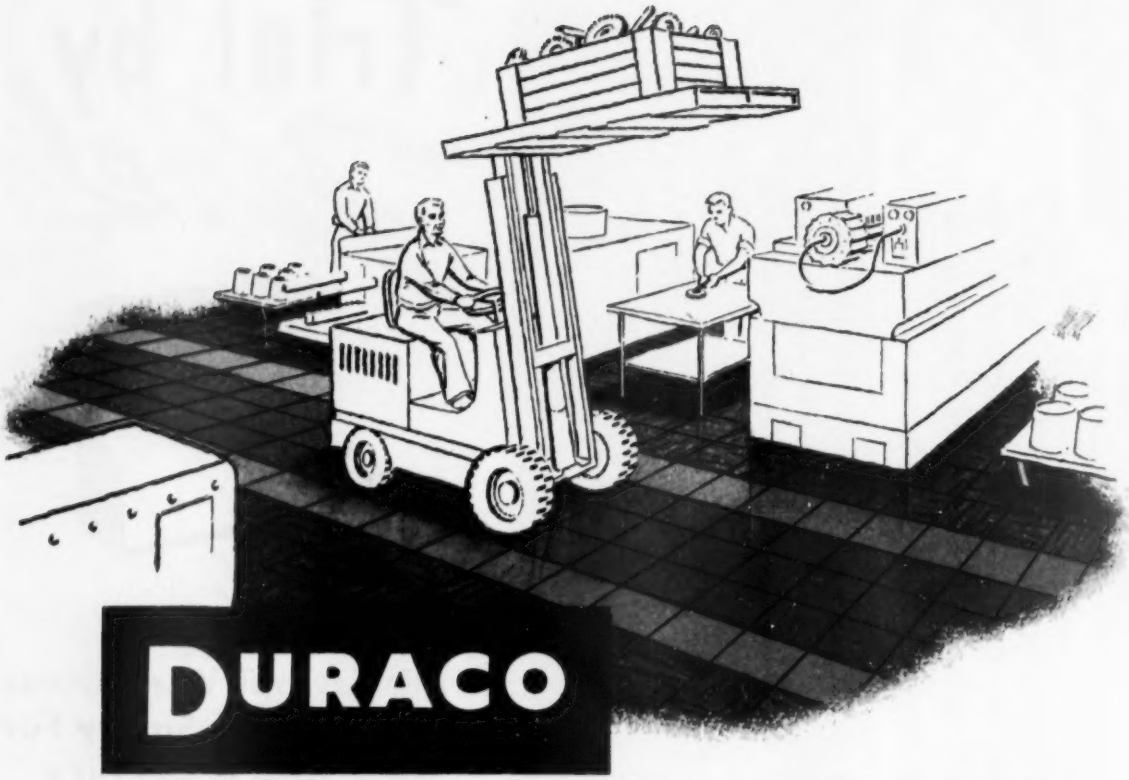
NEW YORK • CHICAGO • FULLERTON, CALIF.

WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS



DURACO

THE STAND-OUT INDUSTRIAL FLOOR

that stands up to in-plant trucking and heavy abuse

Duraco is a *durable* floor, designed especially to stand up under the abuse that industrial floors are subjected to.

DURACO STANDS UP to the wear of heavy rolling loads — built-in rugged strength gives it the ability to withstand in-plant trucking.

DURACO STANDS UP to the abuse and penetration of petroleum oils and greases — its tight, smooth surface won't soften and won't absorb dirt, grime and grease.

DURACO STANDS UP to the shock and impact of dropped tools and heavy objects — it's made to take rough, tough abuse day in and day out.

Duraco is made in 12 attractive colors, 3 sizes and 3 thicknesses, making it possible to solve a great variety of industrial floor problems. Since Duraco is unit-installed, it can be laid functionally to outline trucking aisles, storage areas and traffic-ways.

Write us and we will be glad to have a sales representative call on you to discuss your particular flooring problems.

UVALDE ROCK ASPHALT CO.

FROST BANK BUILDING • SAN ANTONIO, TEXAS

Makers of AZROCK • AZPHLEX • VINA-LUX • DURACO

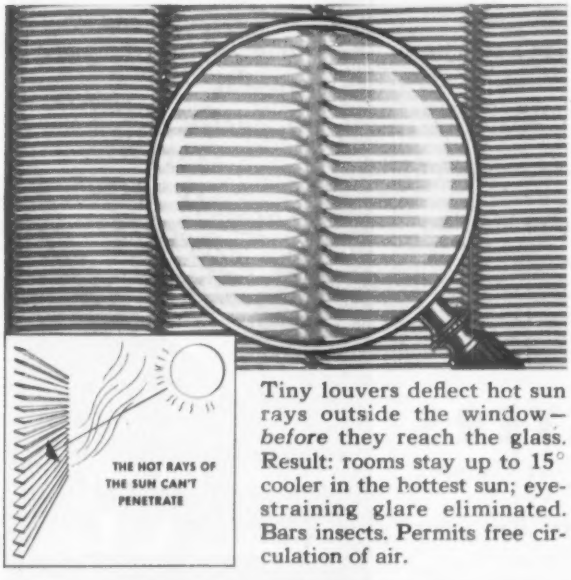
AZROCK FLOORING PRODUCTS

Azrock Floor Products Serve Industry

KAISER ALUMINUM SHADE SCREENING keeps this handsome industrial structure cool and comfortable in spite of direct rays of the southwest sun. Reduces worker fatigue; improves morale.

LOW-COST WAY TO COOL INTERIORS UP TO 15°!

Why let sweltering heat of the summer sun lower efficiency in your office, plant or building? Now you can provide your personnel with spring-like comfort with low-cost Kaiser Aluminum Shade Screening. Here's how this amazing cooling device works: ➧



Tiny louvers deflect hot sun rays outside the window—*before* they reach the glass. Result: rooms stay up to 15° cooler in the hottest sun; eye-straining glare eliminated. Bars insects. Permits free circulation of air.

Cuts air conditioning costs

Even without air conditioning, Kaiser Aluminum Shade Screening gives low-cost protection against summer sun. Where new air conditioning is planned, substantial savings often are effected through use of smaller units. Where air conditioning exists, units operate less often—much more economically.

Kaiser Aluminum Shade Screening does the work of venetian blinds, awnings, and ordinary screens at less than the cost of awnings alone!

Good looking—Long-lasting

Durable, high-grade aluminum won't cause ugly red rust streaks on buildings. Never needs painting. Minimum maintenance required.

ACT NOW! Mail coupon below for free demonstrator.

Kaiser Aluminum

SHADE SCREENING

LOW-COST WAY TO SHADE, COOL, PROTECT AGAINST INSECTS

FREE DEMONSTRATOR! Actual sample of Kaiser Aluminum Shade Screening shows how it blocks sun rays. Full information and name of your nearest dealer included. Mail coupon now!

KAISER ALUMINUM & CHEMICAL SALES, INC.
Consumer Service Division
452 Kaiser Bldg., Oakland, California

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the **Mathews Engineer brings you 47 years of experience in mechanized handling**

In the highly-specialized field of modern conveyer system work, there is no substitute for experience. In Mathews equipment you get that experience, plus the engineering resources and production facilities of three modern plants. That's why we believe you get more for your money—better design—better performance—longer service—when you buy Mathews Conveyers. Write today for Bulletin 852. See what others have done to solve handling problems that might be similar to your own.

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GENERAL OFFICES . . . . . *Mathews Conveyer Company*
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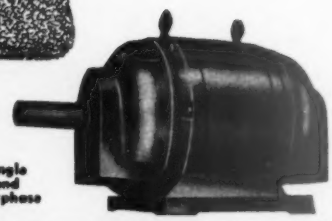
PORT HOPE, ONTARIO

Engineering Offices or Sales Agencies in Principal American and Canadian Cities

CUSTOM-BUILT—
NOT CUSTOM PRICED



Fully enclosed Ball Bearings; semi-enclosed construction that protects against dripping and splashing hazards and assures cool, continuous operation. Available in polyphase—from ½ to 60 hp, single phase—from ½ to 5 hp, for wide adaptability of use and greater flexibility in your power planning.

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The biggest "FAN CLUB" in America is made up of leading Heating and Ventilating Engineers who specify **HERMAN NELSON PROPELLER FANS!**

Send your "FAN MAIL" to:

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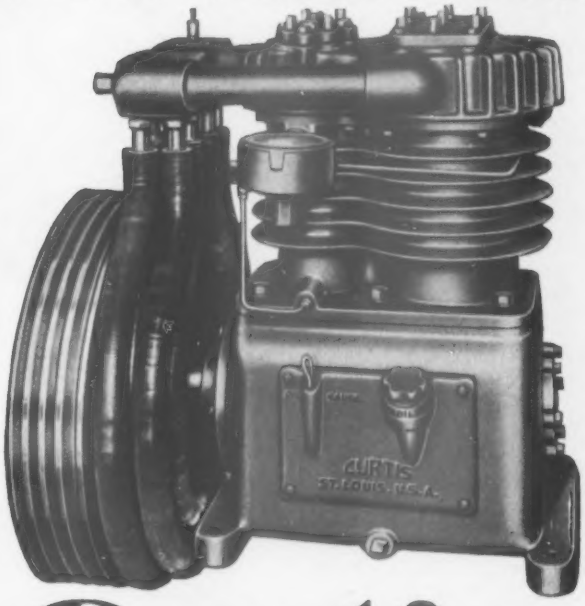
MORE AIR Per Horse Power

- IT'S TWO-STAGE
- IT'S AIR COOLED
- SELF OILING



The New Curtis

MODEL 98 AIR COMPRESSOR

TWO-STAGE AIR COOLED 15 AND 20 HORSEPOWER

TWO-STAGE — More air per kilowatt hour, assuring savings in power bill.

AIR-COOLED — No expensive water bills; eliminates plumbing installation costs.

INTERCOOLER — Four section, finned, providing unusually effective cooling between stages; cooled by cyclone of air from fan flywheel.

SELF OILING — Simple, positive centro ring method; provides pressure lubrication of connecting rod and pistion pin bearings.

TWO TIMKEN MAIN BEARINGS — Tapered rollers; provide easy adjustment made externally without dismantling compressor.

VALVES — Readily removable as assembled units without removing cylinder head or breaking pipe connections or gasket joint.

CRANKSHAFT — Counterbalanced, drop forged — two main bearings — no overhung bearing.

PRECISION WORKMANSHIP — Assures long life and minimum maintenance.

EXPERIENCE — Backed by 99 years of manufacturing — assures you dependable, troublefree service.

Available as a simple compressor or base mounted — motor driven.

LET ONE MAN DO THE WORK
with this Curtis air-operated equipment.

AIR CYLINDERS — for almost any pushing, pulling or hoisting operation.

AIR HOISTS — for low-cost lifting or lowering of materials or machines.

-726

CURTIS PNEUMATIC MACHINERY DIVISION
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☐ THE NEW MODEL 98 ☐ AIR HOISTS ☐ AIR CYLINDERS
☐ AIR COMPRESSOR

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City.....Zone....State.....

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Ford Motor Company chooses

YALE*

MATERIALS HANDLING EQUIPMENT

*Registered Trade Mark

Yale & Towne Manufacturing Company, Philadelphia 15, Pa.

• Just as the Ford Motor Company's slogan is "Ford's Out Front!", so, too, Ford is out front when it comes to maintaining a high degree of efficiency in its manufacturing operations. In keeping with this slogan and with the exacting demands made on all operating equipment in the plant, Ford has specified YALE Electric Trucks as one of the production tools for the mammoth new Ford foundry located in Cleveland, Ohio.

When the Ford Motor Company chose YALE trucks, they knew that it would result in lightening the burden of workers . . . hasten output . . . and cut down on operating costs! It is this kind of confidence in the endurance and reliability of YALE trucks as shown by Ford—in common with other leading manufacturers—that leads users of materials handling equipment, from giant Ram Trucks to compact Worksavers, to rely on dependable YALE industrial Lift Trucks and Hoists.

Gas, Electric, Diesel Lift Trucks • Worksavers • Hand Trucks • Hand and Electric Hoists • Pul-Lifts

Peppered by steel shot for 5 years... U. S. Rubber Permobond is still on the job!

THESE tumbling barrels contain steel pellets which, with soap (for lubrication), are used to ball burnish hardware. The high abrasive action wore out the maple linings in the barrels every 2 to 3 months. Then United States Rubber Company technicians were consulted. They installed the U. S. Permobond Linings that are still in use—even *after 5 years' service!* Permobond is unaffected by the steel shot or the action of the soap.

Permobond linings are extremely rugged. They resist the action of corrosive chemicals and gases. They are impermeable and can be applied to almost any fabricated metal section, big or small, simple or complex. Very often, especially when the container is too big to move, it can be lined with Permobond right in your own plant, quickly and economically. For this and other "U.S." quality products, you may call one of the 25 "U S." branches, each staffed with its own group of engineers. Or write to address below.

No more corrosion in this spray's nozzle! Now it's made of U.S. Rubber's Molded Uscolite. Original nozzle of aluminum developed clogged holes and became too hot to handle. The Uscolite nozzle, attached to U.S. Rubber tubing, is heat-resistant, strong and feather-light!

"U.S." Research perfects it..."U.S." Production builds it... U.S. Industry depends on it.

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SERVING THROUGH SCIENCE

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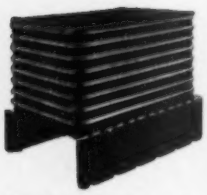
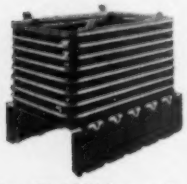


Type PB-120 steel box and skid platform unit.



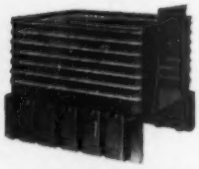
Type PB-120T box and platform unit with tiering lugs.

Old Friends... But a NEW Name! Now... Specify

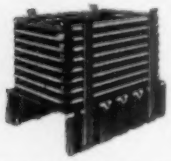
Republic

STEEL BOXES AND SKIDS

Type P-1 skid platform in your choice of standard widths, lengths and clearance heights.



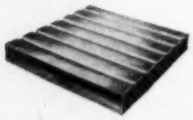
Type PB-650 box and platform unit with sliding end door.



Type PB-120-L box and platform unit with full length lifting lugs.

Type B-80C box unit equipped for crane handling; corrugated bottom.

• You've known and used them for years. You've learned to prefer them for their enduring strength and rigidity in all types of load-bearing and load-carrying service. Now they come to you with a new name . . . "Republic". Simply substitute this famous name for the former "Truscon" name when specifying and ordering. Write for illustrated literature describing the complete line of Republic Steel Boxes and Skids available for use with trucks, crane, or hand-operated units.



Double-Face Steel Pallets provide rigidity and strength with minimum weight; no sharp edges; economical; three types.

All Republic Steel Boxes, Skids and Pallets fully described in illustrated booklet. Write us.

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REPUBLIC STEEL CORPORATION
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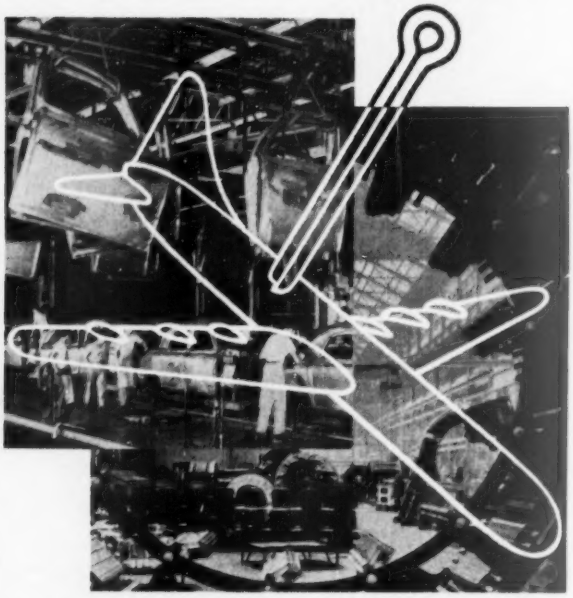
Call DOUGLAS ENGINEERING

for complete production engineering on anything from cotter pins to strato-cruisers.



Up to 3000 hours of specialized engineering talent per day can be efficiently applied to your project. This talent is available for both consultation and actual development work. Manufacturing concerns, using Douglas Engineering Services, are realizing substantial savings in time and money. Time studies, improved methods of processing and material handling, and quality control systems are eliminating production bottlenecks and improving customer relationship. You should investigate Douglas Engineering Co.! Whether your project is small or large, they will undoubtedly show the way toward a better product, produced at less cost.

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- Material control
- Experimental development and building
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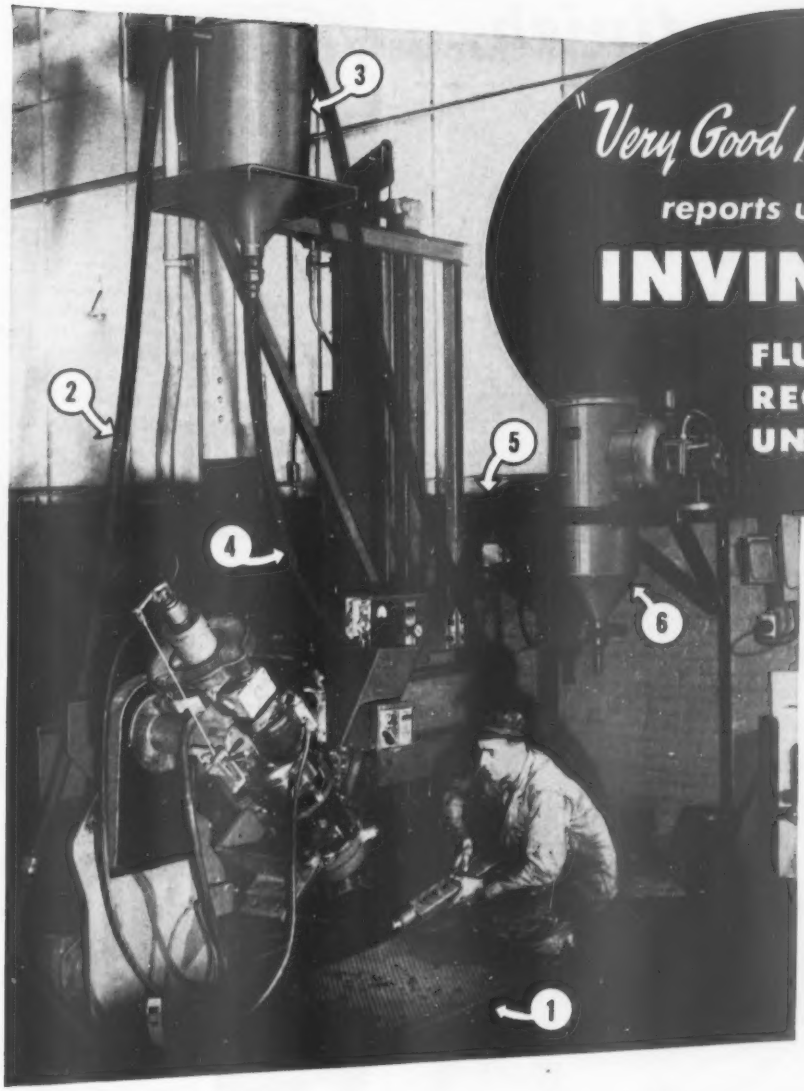
PRODUCTIONEERS FOR INDUSTRY

DOUGLAS ENGINEERING CO.
3437 Goldner, Detroit 10, Mich.



"Very Good Performance"

reports user of this

INVINCIBLE

FLUX RECOVERY UNIT

OPERATION KEY

1. Unfused flux falls through screen to hopper below floor.
2. Recovery Hose draws flux up to Primary Separator Tank,
3. which separates usable flux from slag and fine dust.
4. Usable flux returns via this hose to hopper of welding head.
5. This hose connects Primary Separator to Vacuum Producer.
6. Invincible Model 482, the Vacuum Producer for the entire system.

The Euclid Road Machinery Co.—a pioneer in the manufacture of off-the-highway earth moving equipment — operates this Invincible system to reclaim flux on submerged arc welding. The Invincible unit operates automatically, recovering all unfused flux and returning it to the hopper of the welding head in a continuous flow . . . The mechanism on which the primary separator tank and welding head are mounted can be raised or lowered to accommodate various welding positions. Even when the tank is elevated 18 feet above the floor, the Invincible unit operates efficiently. This setup truly demonstrates the flexibility of location that is possible with an Invincible system . . . Also by removing all fine dust (flux flour that often causes porosity in the weld) this Invincible installation helps prevent rejects and speeds welding production.

Available in many sizes and types, the complete line of Invincible Recovery Units offers the right model for every kind of submerged arc welding job . . . To apply the equipment to your needs, Invincible's unexcelled experience in this specialized field is at your service.

FREE FOLDER on Flux Recovery describes and illustrates the complete Invincible line . . . Send for your copy now.

INVINCIBLE VACUUM CLEANER MFG. CO.
DOVER, OHIO
FOR 40 YEARS, LEADERS IN INDUSTRIAL VACUUM EQUIPMENT

for a fabulous finish...

JEWEL BRAND
Abrasive Belts

for grinding, sanding, polishing — metal, wood, leather, plastics, rubber.

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You Can Know
TONIGHT
EVERYTHING that goes on in your production
TODAY

. . raw material receipts, inspection and inventory, inter-plant transfer, routing of parts and assemblies, rejections and salvage, etc., etc.

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CONTROL TAG SYSTEM

. . the cost of easy-to-handle Control Tags is just a fraction of what they can save you . . by keeping complete, accurate information always before you, day by day.

WRITE US TODAY for samples, full data. . . We have been making Tags for U. S. Industry for almost half a century.

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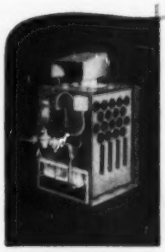
Group or individually controlled units for comfort or process work. Safe, compact, equipped with quiet fan or blower.

Automatic
HEATING FOR EVERY REQUIREMENT

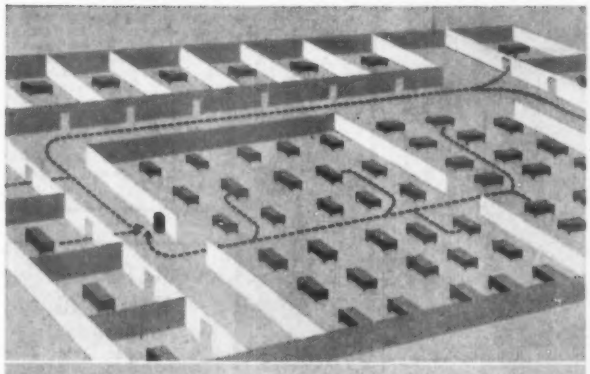


DUCT FURNACE
Basic heat exchanger for engineered heating, air-conditioning systems and production line specialties.

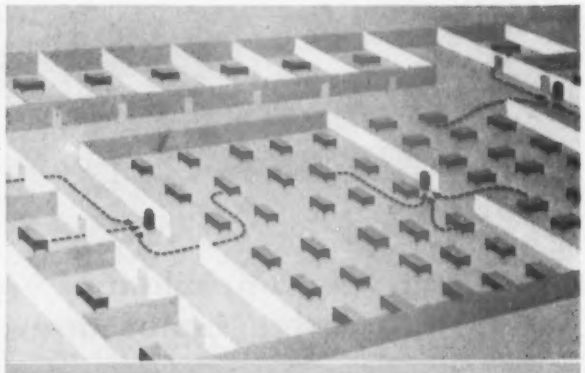
See Sweet's File or write for specific data.

STOCKS AND SERVICE IN PRINCIPAL CITIES
REZNOR MANUFACTURING COMPANY
46 UNION STREET, MERCER, PA.
National Representation, National Acceptance

G-E Work Center Plan applies science to water-cooler placement!



A: TYPICAL INEFFICIENT LAYOUT



B: WITH G-E WORK CENTER PLAN APPLIED

WATER COOLERS

can pay for themselves many times over

RULE OUT COSTLY PLANNING ERRORS! The first scientific study of water-cooler layout, made by General Electric last year, reveals costly misconceptions that creep into water-cooler placement in offices and plants. For example, it is often false economy to use one large cooler instead of two smaller ones!

TYPICAL LAYOUT OFTEN PROVES EXPENSIVE. Layout "A" requires the average worker to travel 130 feet to the nearest cooler. Figuring four round trips a day, 240 days a year, and 300 feet per minute walking-time, this means that each employee walks 47 *miles* a year that account for about 14 hours of lost time and, at $1.50 per hour average, nearly $21.00 worth of work the employer pays for but doesn't get.

MONEY-SAVING "WORK CENTER PLAN." In layout "B," the average distance to the cooler is 60 feet, comparable traveling time about 6½ hours, so you save 7½ hours, or $11.25 per employee. Multiply by 60 (number of employees) and the employer saves $675 a year—more than enough to pay for the added G-E Water Coolers *before the first year is out.* In five years, he saves a total of $3,375! And his investment is safeguarded for a full five years by G.E.'s generous Five-Year Protection Plan.

GENERAL ELECTRIC

HOW MUCH CAN YOU SAVE YOUR EMPLOYER with G-E Water Coolers and the G-E Work Center Plan?

Free study shows you annual payroll-dollars savings—in black and white! Also provides valuable, easy-to-use planning tools. Send in the coupon today. No obligation!

General Electric Company, Dept. FM-2
Air Conditioning Division, Bloomfield, New Jersey

Please send me the complete guide to efficient water-cooler placement.

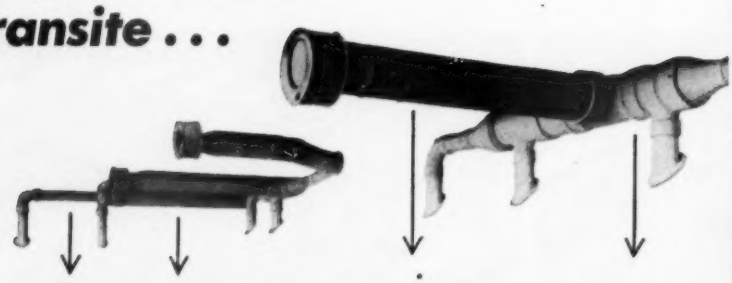
NAME .....

COMPANY .....

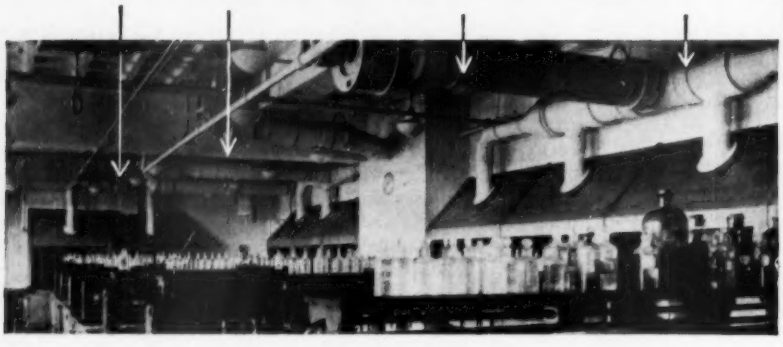
ADDRESS .....

CITY ..... COUNTY ..... STATE .....

SOLVED with Transite . . .



. . . a tough problem of venting corrosive fumes and gases



. . . because **TRANSITE** INDUSTRIAL VENT **PIPE**

is corrosion-resistant, long-lasting

HERE ARE 3 GOOD REASONS why the Transite* Industrial Vent Pipe shown here can be expected to keep down the costs of venting aggressive gases in the laboratory, and to do it for a long time to come:

1. **It's made of asbestos and cement—cannot rust or rot.**
2. **It needs no painting or other preservative finish—ever—whether used indoors or out.**
3. **It is resistant to practically all corrosive fumes, mists and gases.**

Transite Industrial Vent Pipe—as vents, ducts, stacks for indoor or outdoor use in laboratories and industrial plants—is adaptable to practically any requirement. It is quickly and economically installed. It is light, strong and durable . . . is easy to assemble . . . can be worked with ordinary tools. It comes in sizes up to 36″ in diameter, and there is a complete line of fittings available for every need. For further details on Transite Pipe for your industrial venting problems, write to Johns-Manville, Box 60, New York 16, N. Y.

JM PRODUCTS

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SIZE IDENTIFIED ASSEMBLY SIMPLIFIED

The Only

SIZE-MARKED GEAR GRIP SOCKET HEAD CAP SCREW

The size is clearly incised on the head, can be seen at a glance. It prevents errors by "green" workers, helps veterans also to speed assembly. It saves time and wasted screws when sizes get mixed up.

It's a sales feature for your product. Your customers' maintenance men will like the Size-mark . . . it aids them in reassembling after servicing. Gear Grip prevents slips, speeds work, even when fingers are oily.

Since there is no better Socket Head Cap Screw made, why not get these important extra features offered only by P-K? Ask for samples. Parker-Kalon Corp., 200 Varick St., New York 14, N.Y.

FOR ANY TYPE SOCKET SCREW—
REMEMBER

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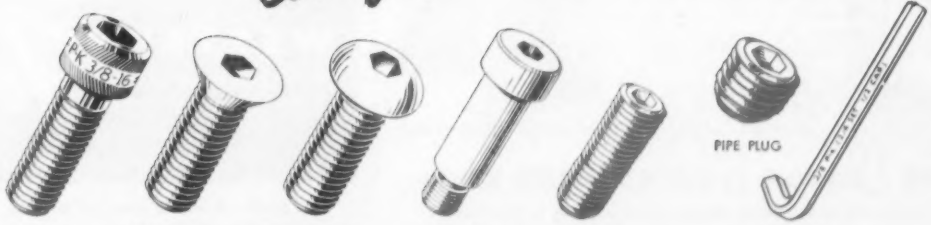
TRADE MARK REG. U.S. PAT. OFF.

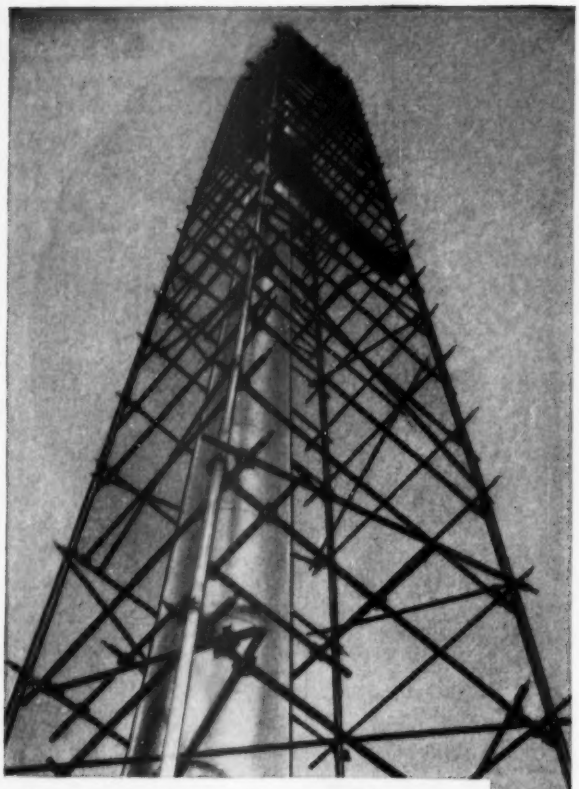
PARKER-KALON®

Sold through Industrial Distributors, the Supply Specialists that serve you

Cold-forged **SOCKET SCREWS**



CAP FLAT HEAD BUTTON HEAD SHOULDER SET HEX KEYS



How To Keep Costs Down . . . When Maintenance Goes "Overhead"

When labor goes off the ground, costs and risks go up too!

Patent Scaffolding will save you time and money in all phases of off-the-ground maintenance — painting and cleaning; electrical work, machinery maintenance and many other jobs! Yes, and increase safety at the same time! . . . PS has exactly the *right* scaffolding to fit the job — *and the only complete scaffolding service!* It's worth remembering.

WRITE NOW FOR
FREE GUIDE to selection of the right equipment for any off-the-ground job. Just ask for Bulletin G205.

For Greater Safety... Efficiency... Economy

THE PATENT SCAFFOLDING CO. INC.

38-21 12th Street, Dept. FM&M, Long Island City 1, New York
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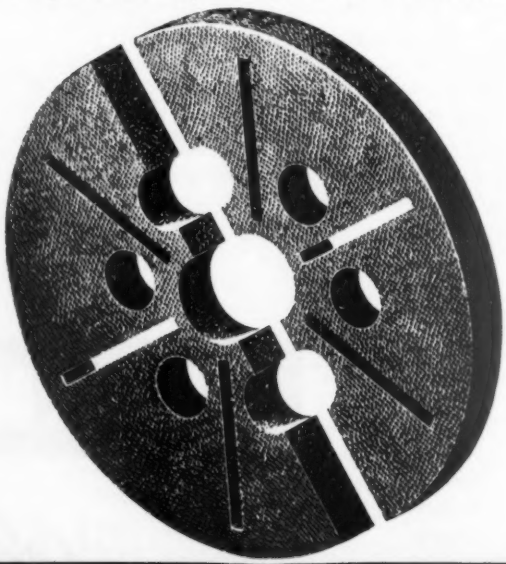
Western Felt users over a long period of years have placed their stamp of approval on a long list of its products. They know from experience the "plus value" in every Western Felt component part. Highest precision in its processing and cutting produces a uniformity that minimizes rejections—prevents failure of the finished product from felt causes. They are available from wool softness to rock hardness—never lose shape—do not ravel or fray—resist oil, water, age—are resilient, flexible, compressible—may be cut to close tolerances.



WESTERN Felt WORKS

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Manufacturers and Cutters of Wool Felts

Acadia Synthetic Products Division, WESTERN FELT WORKS,
Processors of Synthetic Rubbers — Sheets, Extrusions, Molded Parts

COST

-after 276 working days...

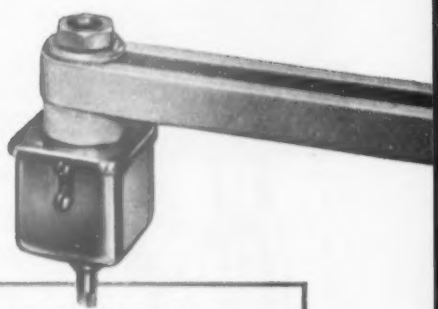
IT WROTE OFF ITS COST IN 10½ MONTHS!

This report comes from a well-known machine tool manufacturer (not us!). We can show you many similar ones from all kinds of plants. They all add up to one incontrovertible fact—Monarch Air-Gage Tracer controlled, fully automatic turning, with its single running tool, delivers output at top efficiency. Why not? Look how many ways it saves! In turning time. In setup time. In tooling time and costs. In subsequent grinding. It's true of short runs as well as long ones.

The Monarch Air-Gage Tracer is known everywhere for its superb accuracy of duplication. The swiveling type used here adds to this accuracy an amazing versatility. Apply it to our 20 x 72 Series 60 Lathe and add the Autocycle Control as above, and you have the shop man's dream come true—the ultimate in versatility *plus* fully automatic operation.

This manufacturer, after only brief experience with his Series 60, quickly added a 20 x 168 Model M Heavy Duty Lathe with similar equipment. Together, using round templates, these machines are delivering automatic output of over 600 jobs!

The Air-Gage Tracer is right! Its performance is right! Why don't *you* write—for complete information? Request Booklet #2606 and mention your specific requirements. . . . *The Monarch Machine Tool Company, Sidney, Ohio.*



HERE'S HOW!

. . . And by the user's own figures! This lathe was bought to turn 20 to 25 jobs. It proved so versatile that, with the larger Model M, it's now turning 600. Time savings vary from job to job, but here's a sample. One difficult work piece used to require 3½ hours' turning. It's turned now—in lots of 24—in 10 min. per piece. Each *lot* in only slightly more time than it used to take for each *piece!*

Monarch

ACCURACY • ECONOMY • LONG LIFE

TURNING MACHINES

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"TAPE-STRAP" is so strong, with its thousands of length-wise filaments, that you can't break it.

When "TAPE-STRAP" was used instead of previous strapping method, as shown in package at right, only a few short pieces were needed, resulting in a saving of 30% in labor and material costs of reinforcing.

"Tape-Strap" is the trade mark of the brand of filament tape manufactured by Mid-States Gummed Paper Co.

Cost of reinforcing cut 30% after switching to dependable TAPE-STRAP*

Pheoll Manufacturing Company manufactures nuts, bolts, screws. Heavy, damaging material, vicious on cartons. Yet Pheoll switched to "TAPE-STRAP" after rigid tests that involved shipping trial cartons everywhere by every method of transportation. After seven months of exclusive use of "TAPE-STRAP" they have yet to learn of one single carton damaged in transit. And Pheoll packaging men like "TAPE-STRAP" better than their former method.

This is just one of many success stories that prove "TAPE-STRAP's" advantages in many shipping operations. "TAPE-STRAP" eliminates the danger of sharp corners that hurt hands, clothes or cartons. It is so strong you can't break it and often short strips across container seams are all you need to use. "TAPE-STRAP" can't be slipped off and replaced, yet obviously no special equipment is needed for application.

APPROVED — "TAPE-STRAP" is approved by the Official, Southern, and Western Classification Committees (Rule 41, Sec. 8 (b), Supp. 29, C.F.C. No. 19), and by Railway Express Agency, Inc. (Rule 18 Packing Requirements — Sealing).

FREE Sample Roll — Test "TAPE-STRAP's" astonishing strength, try it on your own containers. Write for free sample roll and details of "TAPE-STRAP" construction and use.

MID-STATES Gummed Paper Company
2511 S. Damen Ave., Chicago 8, Ill.

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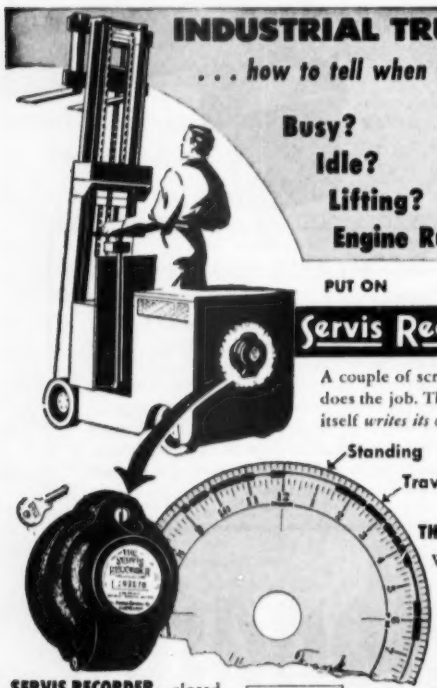
INDUSTRIAL TRUCKS
. . . how to tell when they are

Busy?
Idle?
Lifting?
Engine Running?

PUT ON

Servis Recorders

A couple of screws or bolts does the job. Then the truck itself *writes its own story!*



THE CHART

Wax covered, no ink or pencil needed; a sapphire stylus marks the record—a picture of the day's work at a glance.

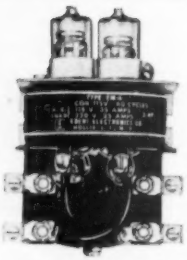
SERVIS RECORDER—closed. Just bolted on—no connection with any moving part.

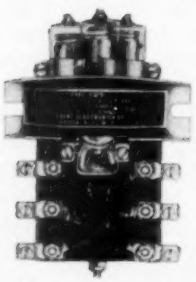
Write for Bulletin IT

THE SERVICE RECORDER COMPANY
1375 Euclid Avenue • Cleveland 15, Ohio

Mercury Plunger Relays
FOR
2 and 3 POLE APPLICATIONS

- Hermetically Sealed
- Silent Operation
- Explosion Proof
- No Maintenance
- Mercury–Mercury Contact

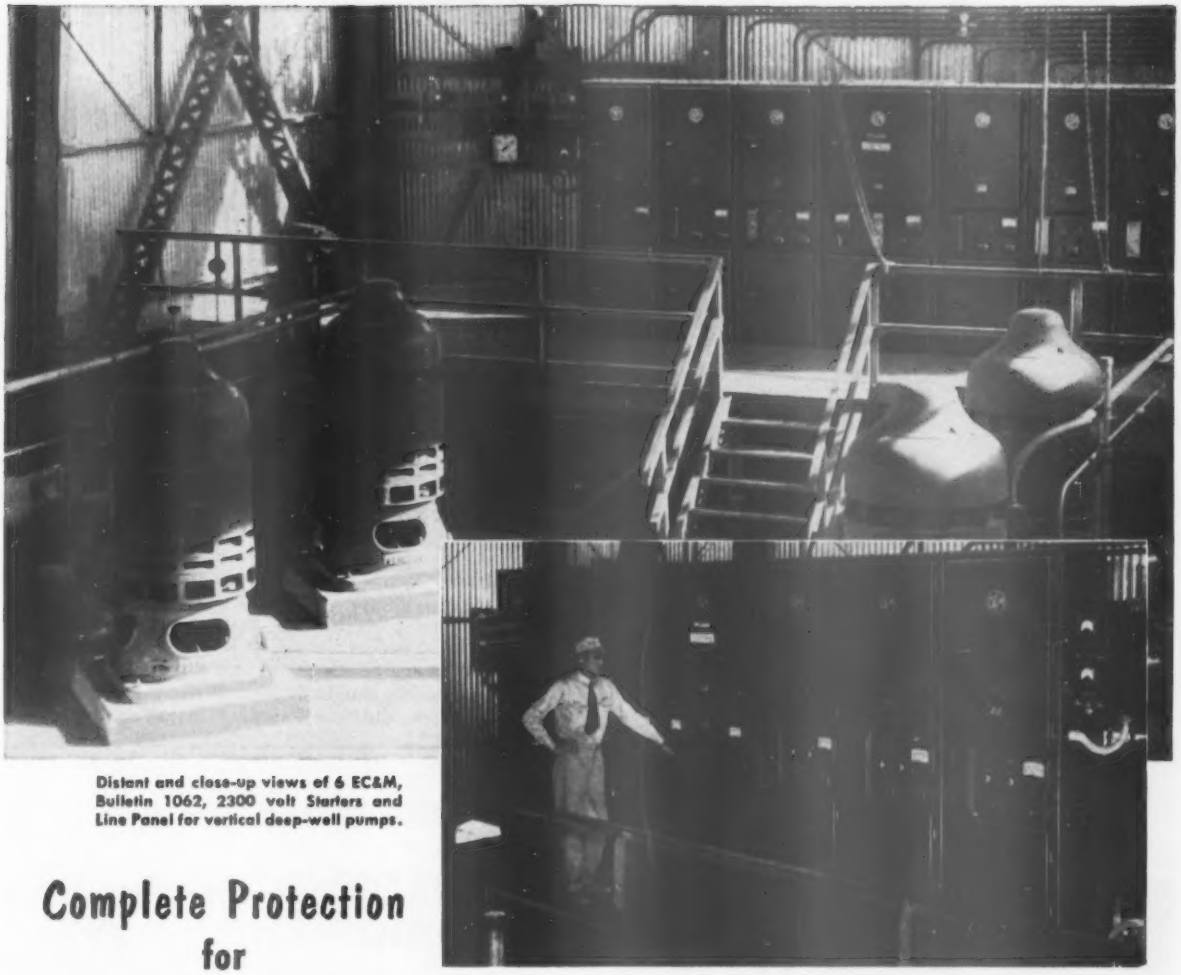




The many advantages of mercury plunger construction are now available in relays for 2 and 3 pole applications.

Compact size and high current handling capacity (up to 60 amps) permits realistic savings in cost and space. For complete details just ask for our free catalogue—and don't forget—our engineering division is ready to serve on any of your relay problems.

EBERT ELECTRONICS CO.
185-09C Jamaica Ave., Hollis 7, N. Y.



Distant and close-up views of 6 EC&M, Bulletin 1062, 2300 volt Starters and Line Panel for vertical deep-well pumps.

Complete Protection for ESSENTIAL DRIVES BY EC&M 2300 VOLT STARTERS

When plans call for 2300 volt power, the motor drives connected to this source take on added importance—they are generally considered "main-line" and highly essential to a plant's output. Such drives deserve "all-out" protection and EC&M Type ZHS 2300-4600 volt Motor Starters are designed to provide it.

Illustrated above is a typical installation of these EC&M Starters. Main line contactor is the well-known Type ZHS Magnetic Contactor having high interrupting capacity—ability to provide frequent starts and stops with only routine inspection. Front cubicles are the aligning type; self-contained bus is an optional feature. Safety door interlocks open the contactor circuit and avoid pulling disconnect switches under load. Push button starting brings each motor up to speed with greater skill than human hands could do it.

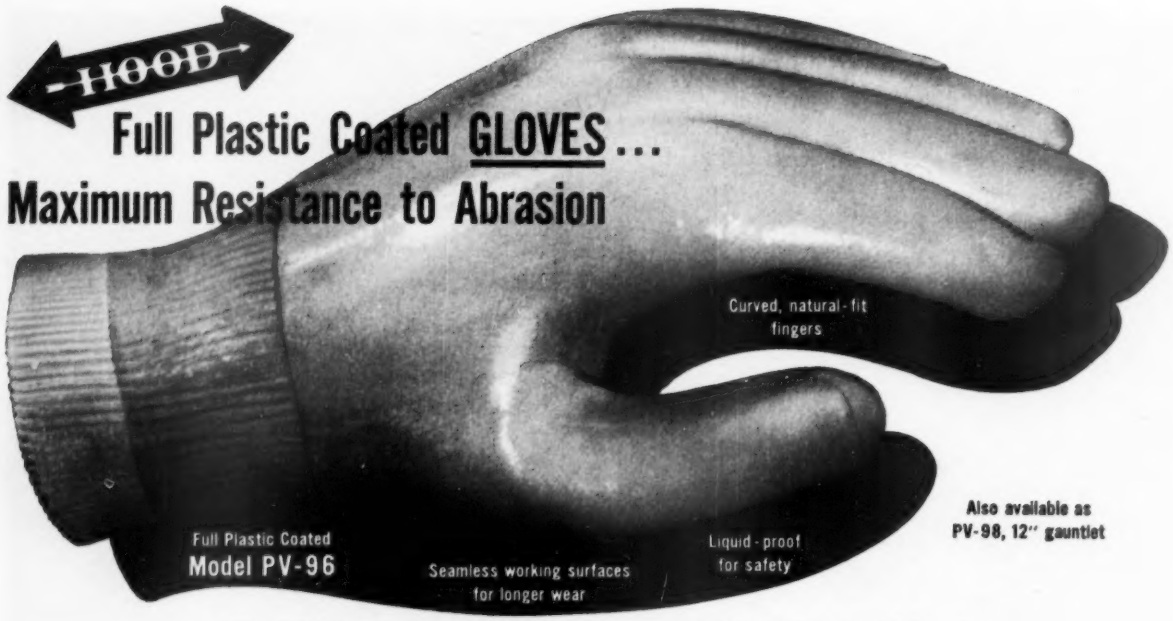
When making initial cost estimates, get the facts on EC&M High Voltage Starters. Our nearby office will be glad to supply full information on starters which give complete protection.

WRITE FOR BULLETINS 1062 and T9-117 reprint.

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79TH STREET • CLEVELAND 4, OHIO

HOOD

Full Plastic Coated GLOVES...
Maximum Resistance to Abrasion



These Hood gloves with *fully* curved fingers give greater comfort, plus maximum resistance to abrasion and wear. Made from a new, scientifically compounded formula which results in a perfectly fused film, these new gloves have a uniform coating with no weak spots. Both benefits have been proved by Hood's "on-the-job" testing.

Hood makes a complete line of industrial rubber and plastic gloves that will help keep your safety standards high. Write today for our new illustrated catalog featuring the Hood Glove Guide, which shows you "how to choose the RIGHT Glove for EACH job".

HOOD RUBBER CO., Watertown, Mass.

Directs light exactly as needed as easily as pointing your finger

FOSTORIA
LOCALITES
for Machine Tools, Assembly and Inspection Benches

NEARLY A MILLION NOW IN USE

MODEL 3470-P-172
Overall length 48¼". Three instantly adjustable joints. Circular base for machine or wood screw mounting.

$7.16 EACH
in package of 6
Single Units $8.95 Each

- **Rugged Construction** withstands vibration and rough handling
- **Instantly Adjustable** with flexible ball and socket joints
- **Reflector** accommodates 100 watt or any A-19 or A-21 medium screw base lamp
- **Baked Enamel Finish** — Exterior, smooth Gray — Reflector Interior, high temperature White
- **Wired Complete** with switch socket and 8-ft. oil-resistant cord and moulded plug

LOCALITE fostoria for Light ON the Job

Write for complete catalog of Localite models with various type reflectors, arms and bases for every industrial use.

THE FOSTORIA PRESSED STEEL CORPORATION
FOSTORIA, OHIO
Localites available through wholesalers everywhere

What your plant can
accomplish
with Vision Screening

We have just made up a report of savings made by 59 plants:

Big savings in *cost of training new employees* (as high as 75%); reduction in *accidents* and *spoilage;* labor *turnover* reduced 30% or more.

Also increased earnings of employees, less absenteeism, and other gains.

Briefly summarized in a Booklet — which we'll be glad to send to any personnel official on request.

Keystone View Co., Meadville, Penna. Pioneers in Binocular Vision Testing.

KEYSTONE
OCCUPATIONAL VISUAL SERVICE

World's strongest tape?

Even the world's strongest wrestler can't break it! This unbelievably tough "Scotch" Brand Filament Tape proves itself on scores of "impossible" heavy-duty jobs.

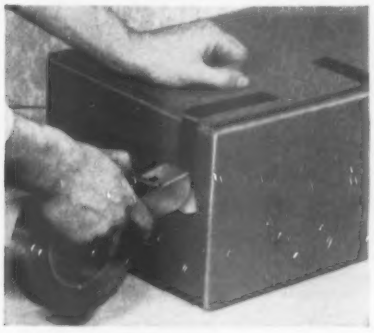
Paul Baillergeon, world's strongest wrestler

REINFORCING these 57 lb. cartons is a cinch with "Scotch" Brand Filament Tape No. 880. Unlike conventional banding materials, tape doesn't cut into cartons or make loading difficult.

SECURING free end of huge sheet metal rolls is another job done faster, easier with "Scotch" Brand Filament Tape No. 880. Despite rough handling, only one strip of tape is needed.

BUNDLING veneer door rails, moldings, millwork and siding *safely* with "Scotch" Brand Filament Tape No. 880. Tape prevents slipping and sliding of pieces in bundles. Easy disposal, too!

BANDING and identifying tubing, conduit, and steel rod stock with "Scotch" Brand Filament Tape No. 880. Automatic banding equipment is available. Tape comes in red, white, black and transparent for color coding.



HANDY DISPENSER offers quick method of applying "Scotch" Brand Filament Tapes. For more information, plus a sample roll of tape for testing purposes, write Minnesota Mining & Mfg. Co., Dept. FM-43, St. Paul, Minn.

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BRAND
FILAMENT TAPE
NO. 880

Made in U. S. A by
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The term "Scotch" and the plaid design are registered trademarks for the more than 200 pressure-sensitive tapes made by the makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N. Y. In Canada: London, Ont., Can.

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TWIN DISC'S
Oil-Actuated
Multiple Plate Clutches

Design Advantages

1. No adjustment needed to compensate for plate wear.
2. Constant torque capacity regardless of plate wear.
3. Readily adaptable to remote control, thus eliminating complex actuating linkages.
4. High torque capacity, controlled by variable oil pressure.
5. Push button control for less cost, since clutch has its own integral oil cylinder.

On-the-Job Advantages

1. No adjustment downtime, no production lost time.
2. Longer plate life since clutch never needs adjusting, always exerts full design torque.
3. No mechanical controls to take up or adjust for wear.

Specify Twin Disc Oil-Actuated Model MOS-MOD clutches—precision designed for continuous service with a minimum of maintenance. Write to the Twin Disc Clutch Company, Racine, Wisconsin for complete information.

New Multiple Plate Clutches; available in Models MOS (single) and MOD (duplex, shown).

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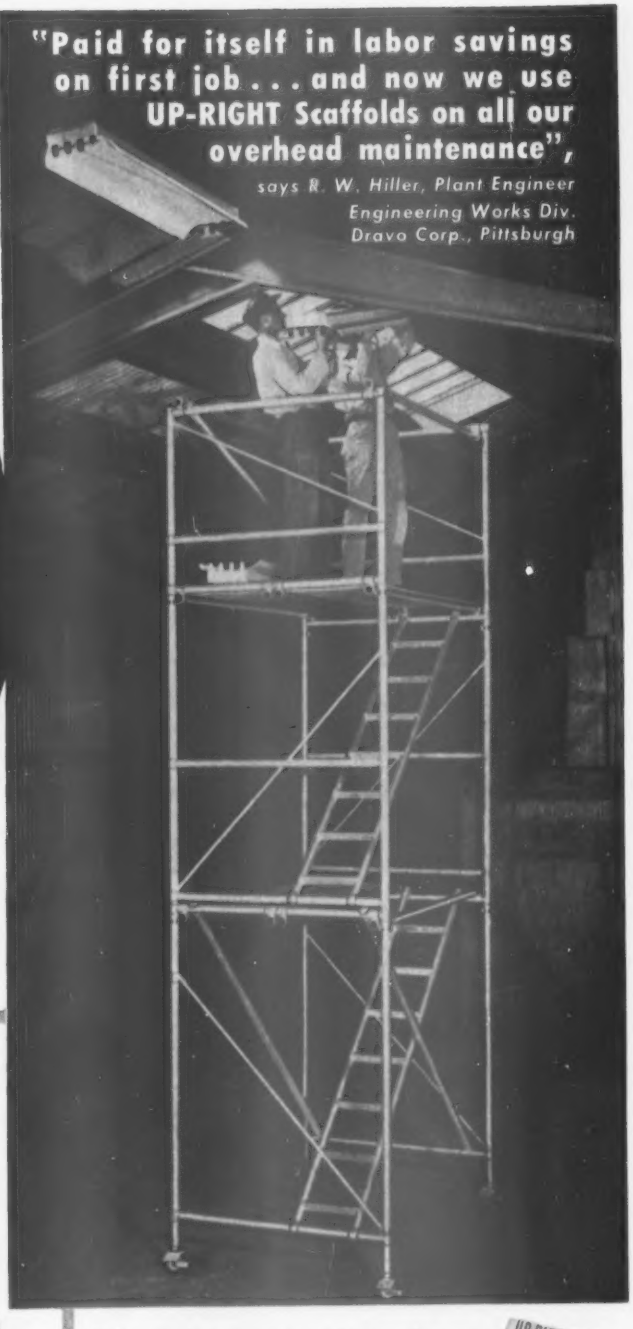

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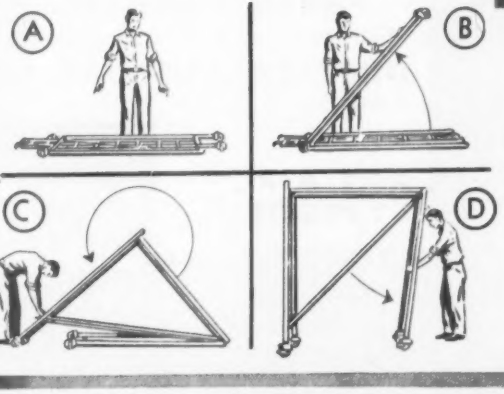

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Offices in all principal cities

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Let's assume you're a Conveyor-Project Engineer employed by Hapman —

QUESTION 1—Which materials in panel would you advise can be efficiently handled by Hapman Tubular Sealed-pin Chain Conveyors?

QUESTION 2—To elevate a granulated chemical 29 ft. above floor, at 2,000 lbs. per hour, what motor would you specify?

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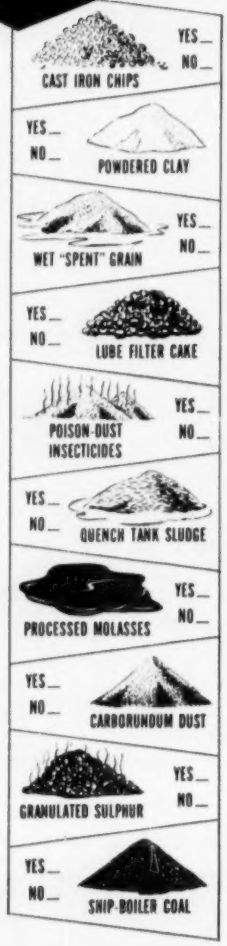
3 H.P.____ 5 H.P.____

QUESTION 3—A prospect asks, "What is the *outstanding* advantage of a Hapman Tubular Conveyor?" What's your reply?

ANSWERS: 1—All now successfully handled except sticky molasses. 2—One horsepower. 3—Hard to answer. In one case, ability to convey *wet* material is vital; in another the Hapman's air-tight seal keeps moisture or dust *out*—or fumes *in*. Ability to curve around obstacles may be essential. Your best answer: "They cut costs!"



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Write for details and Bulletin FM-453

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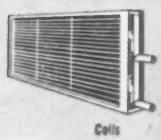
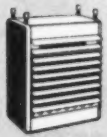

Coils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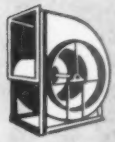
Engineers and manufacturers of a complete line of finest quality heating, ventilating and air conditioning equipment.

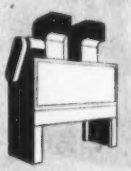
Department FM-453


Ventilating Blowers

Evaporative Condensers

Housed Ventilating Sets

Modu-aire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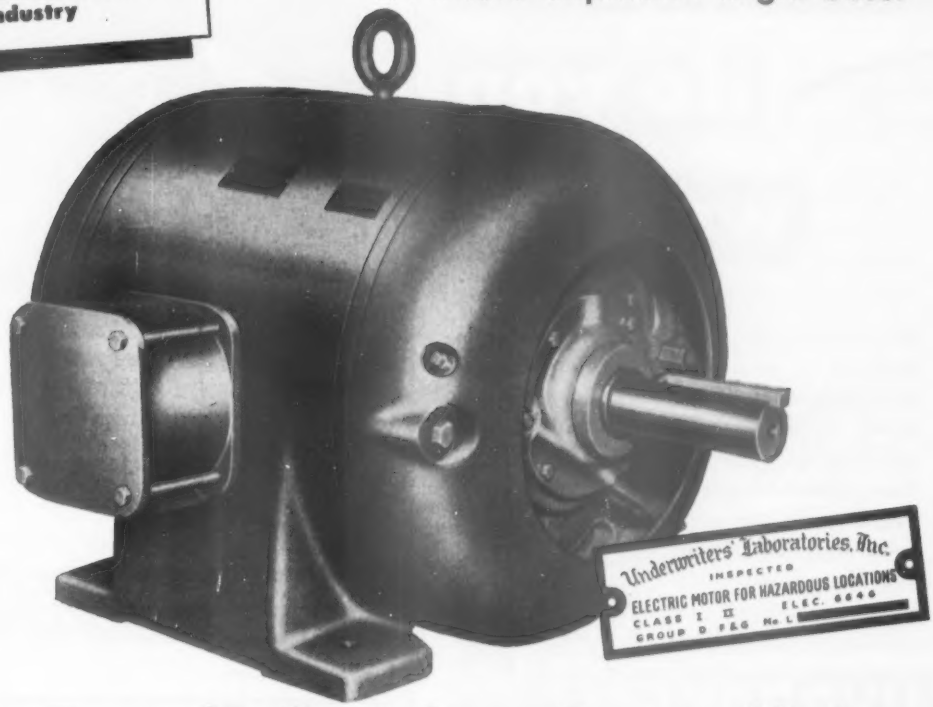

Wagner Type JP Cast Iron Frame Motors

Wagner type JP cast iron frame motors are built for use in chemical plants, oil fields, refineries, steel mills—for any application where corrosive and explosive conditions might prevail.

These rugged motors are totally-enclosed in rust- and corrosion-resistant cast iron. They are fan-cooled by an externally mounted blower, made of non-sparking bronze, that forces air through ventilating passages in the frame. They feature completely protected laminations . . . special varnish treated windings . . . a running shaft seal . . . and an explosion-proof conduit box with machined fits.

A standard type cast iron frame motor (for applications where protection against explosion is not required is also available. Both types are built in ratings from 2 to 250 hp, with either normal or high torque characteristics.

Wagner Bulletin MU-132 gives complete information on these protected motors. A nearby Wagner engineer can help you select a Wagner Motor to meet your most exacting specifications. Consult the nearest of our 32 branch offices, or write us.

Wagner Electric Corporation EST. 1891

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6412 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS – AIR AND HYDRAULIC

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M53-9

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36 MODELS, 500 to 200,000 LBS.

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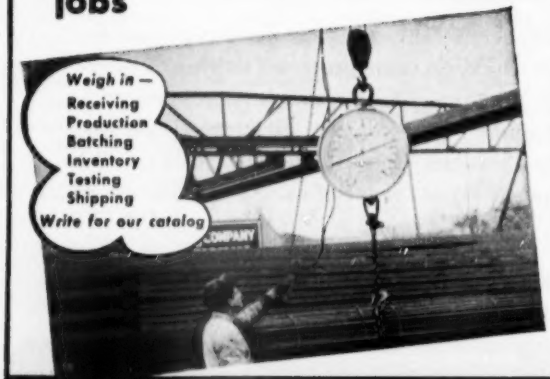

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FREE 2-color R-Mir-Dek brochure. Write to Department FM-4.

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MANAGEMENT & MAINTENANCE
330 W. 42nd St., New York, N. Y.

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Are some of your prospective clients in spots where it is hard—or impossible—to contact them? If so, then a card in this Section may well be the solution to your problem.

HERE'S HELP

for your engineer-recruitment problem

Engineers' Joint Council and The Advertising Council offer free, expert help to advertisers promoting engineering as a career.

The booklet reproduced here was prepared by The Advertising Council in cooperation with the Engineers' Joint Council to help you make your advertising work most effectively in recruiting engineers for the future.

1. It tells you what the problem is and the important part you can play in solving it.
2. It outlines the advantages of an engineering career to help your company develop advertising appeals.
3. It informs you as to the current activities of industry in the education and recruitment of engineers.
4. It offers specific suggestions as to what you can do (from present manpower).
5. It provides material that you can use in your own local and national programs.

Many advertisers are using this booklet today. They say that it helps in orienting their engineer-recruitment advertising to industry-wide recruitment programs.

Send for this Free campaign guide
Prepared by
THE ADVERTISING COUNCIL
for the
ENGINEERS' JOINT COUNCIL

JUST MAIL THIS COUPON!

The Advertising Council, Inc.
25 West 45 Street
New York 36, New York

Gentlemen: Please send me a *free* copy of *"How your company can help promote engineering as a career."*

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COMPANY: .....

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When required personal interviews will be arranged for evenings or Saturdays.

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Tool, equipment design in connection with forming, processing metal parts.

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P6958 Factory Management & Maintenance
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The position is a permanent one in a growing organization and offers a real challenge to an ambitious man. One or two years' industrial engineering experience preferred, including experience in making cost reduction studies, time and motion studies, and setting work standards.

State education and experience in application letter.

P-7253, FACTORY MANAGEMENT & MAINTENANCE
330 W. 42nd St., New York 36, N. Y.

WANTED

Plant Engineer with 10 to 15 years experience in food industry for manufacturing plant in New Jersey. Should be familiar with steam plant, air conditioning and automatic packaging machinery. Responsibilities will include all plant maintenance. M.E. degree preferred. Send complete resumé and salary requirements to

P-7377, Factory Management & Maintenance
330 W. 42 St., New York 36, N. Y.

REPLIES (Box No.):
Address to office nearest you
NEW YORK: 330 W. 42 St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

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MAN WANTED to cover Industrial Accounts for well-known established Electrical Wholesaler located in Brooklyn. Part time or full time. Must have active accounts. Electrical experience not necessary. Drawing and expenses against commission. RW-7219, Factory Management & Maintenance.

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SALARIED PERSONNEL $3,000-$35,000. This confidential service, established 1927 is geared to needs of high grade men who seek a change of connection under conditions assuring if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. D, 241 Orange St., New Haven, Conn.

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START $12,000 to $15,000

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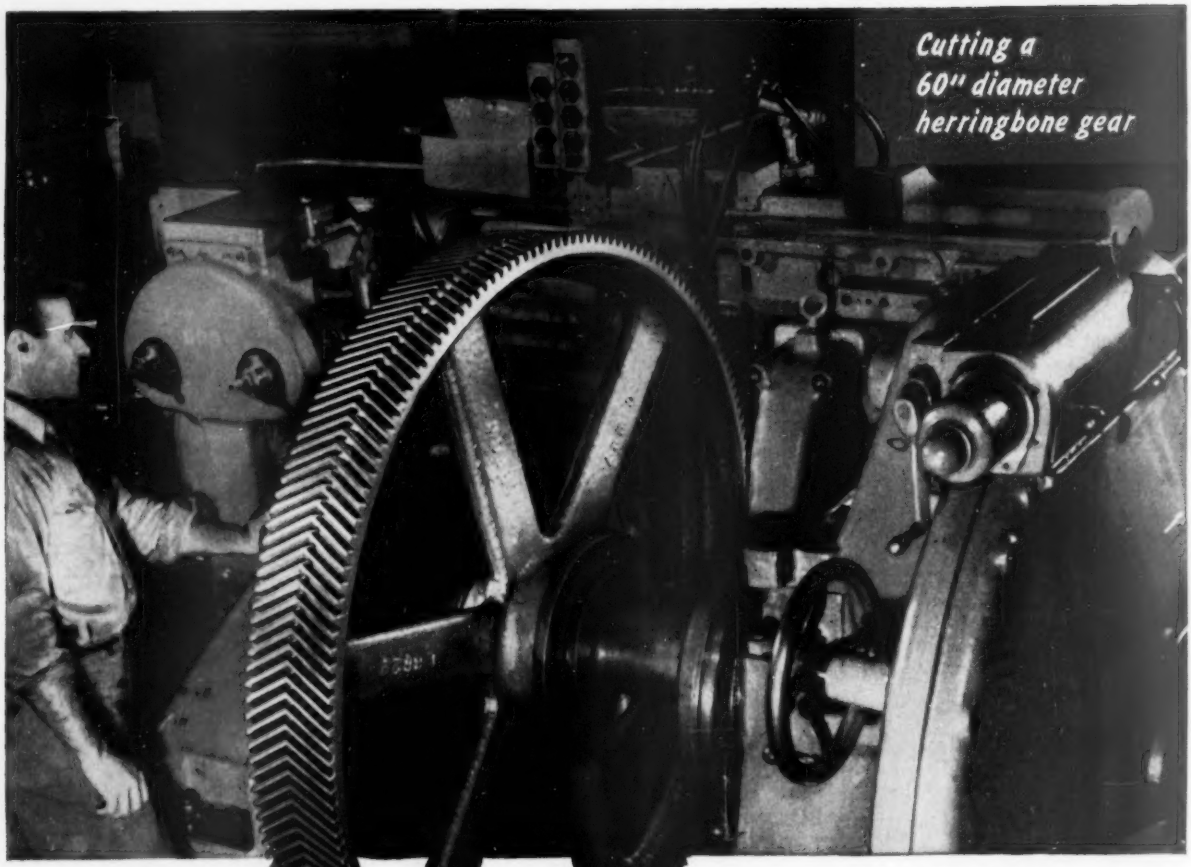

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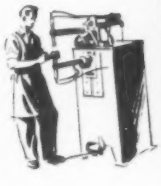

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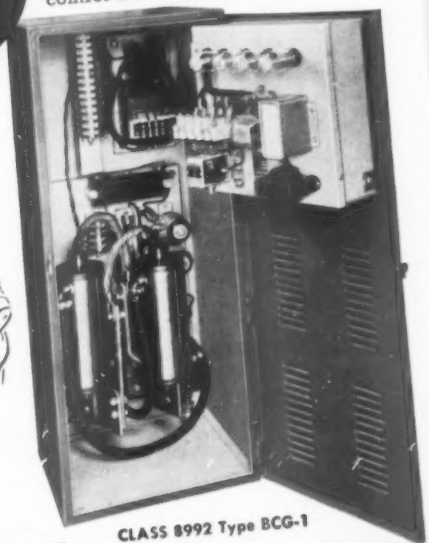

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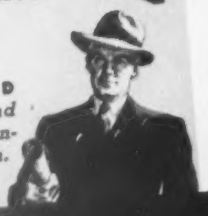

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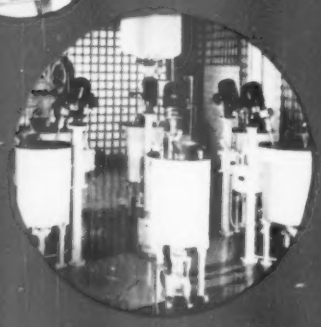

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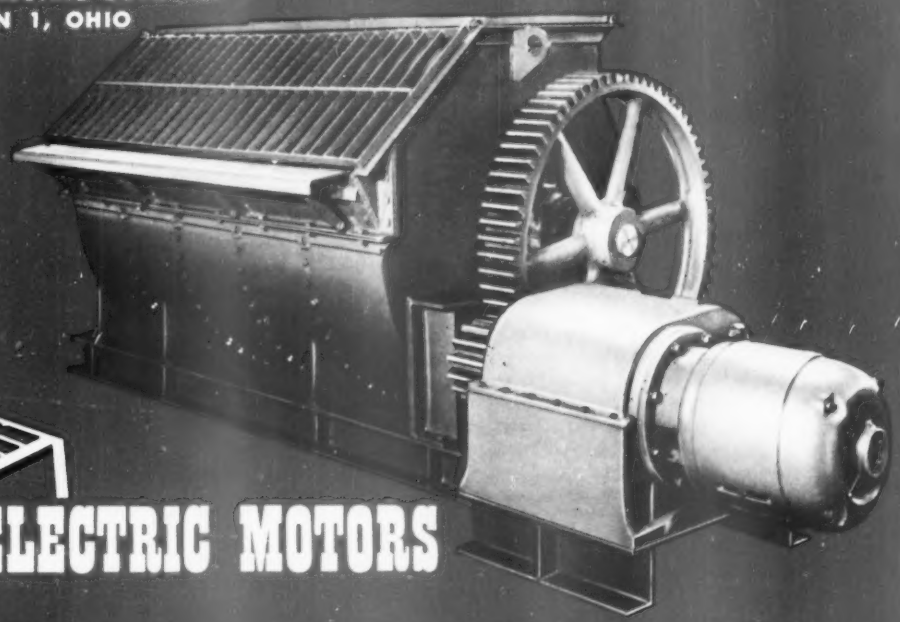

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